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AMERICAN

DYESTUFF REPORTER

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"Musts" for Automotive Fabrics

The *Solophenyl* Colors* have caused the mills now using this series of direct colors many agreeable surprises.

One of the latest and most impressive demonstrations has been their fastness to wet finishing on viscose staple fibres used in Wool and Rayon automotive fabrics presently in vogue.

This property supplementing their already demonstrated superior fastness to light has made the *Solophenyl Colors* "musts" for automotive fabrics.

* Reg. U. S. Patent Off.

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COLORISTS

SULFONATED OILS ACIDS STARCHES
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For High Compatibility...

USE DECERESOL 1861 SOFTENER

DECERESOL* 1861 SOFTENER is an extremely compatible durable type softener composed of surface active colloids. It yields a finish of superior smoothness and suppleness of handle to cottons, woolens, rayons and other synthetics.

DECERESOL 1861 is highly compatible with gums, starches, solvents, acids and dilute alkalies (less than 1% NaOH). When used in proper ratios, satisfactory reaction is obtained with sulfonated oils and casein solutions. In warm water, ordinary stirring produces good dispersion and stable suspension. DECERESOL 1861 also possesses good wetting ability, normally making use of additional wetting agents unnecessary. For further information as to general properties and methods of application, write today to:

✓ **Check These Special Properties of DECERESOL 1861 SOFTENER**

✓ Reduces bleeding of direct colors and crocking of napthol colors. Inhibits gas-fading tendencies of certain acetate colors.

✓ Excellent for yarns and fabrics and for knit goods where maximum elasticity is desired.

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✓ Will not discolor white goods when specified concentrations are applied.

✓ Yields greater resistance to hot-iron scorching than many cationic softeners.

✓ Will not develop odors on goods. White goods will not retain chlorine when bleached.

AMONG CYANAMID PRODUCTS FOR THE TEXTILE INDUSTRY ARE: Penetrants • Softeners • Finishes Sizing Compounds • DECERESOL* OT Wetting Agents • PARAMUL** 115 Water Repellent and other specialties and Heavy Chemicals

*Reg. U. S. Pat. Off. **Trade-Mark

American Cyanamid & Chemical Corporation
(A UNIT OF AMERICAN CYANAMID COMPANY)

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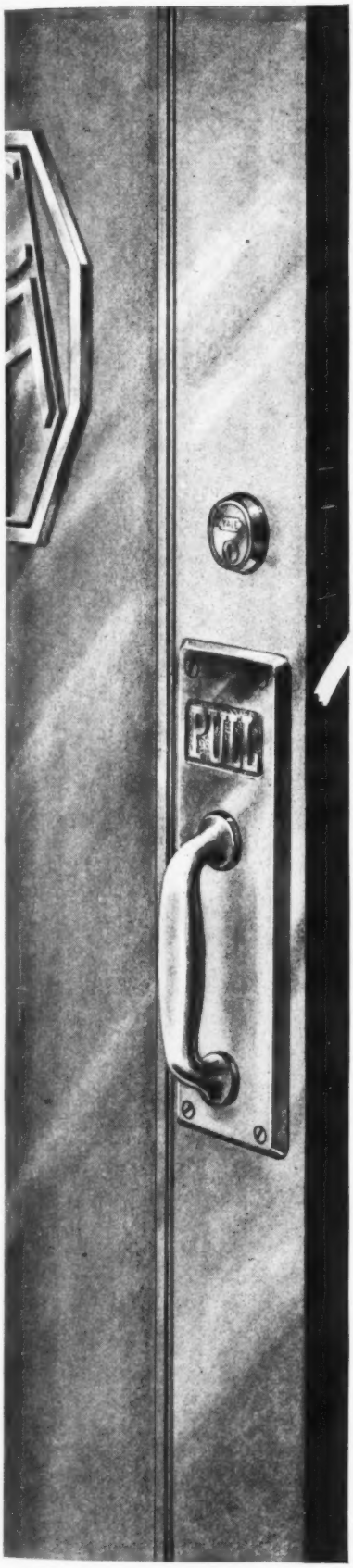

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COPRANTINES

A NEW RANGE OF COLORS
WITH BOTH
WASH AND LIGHT FASTNESS

For direct dyeing rayon and cotton
to *extra* fastness requirements.

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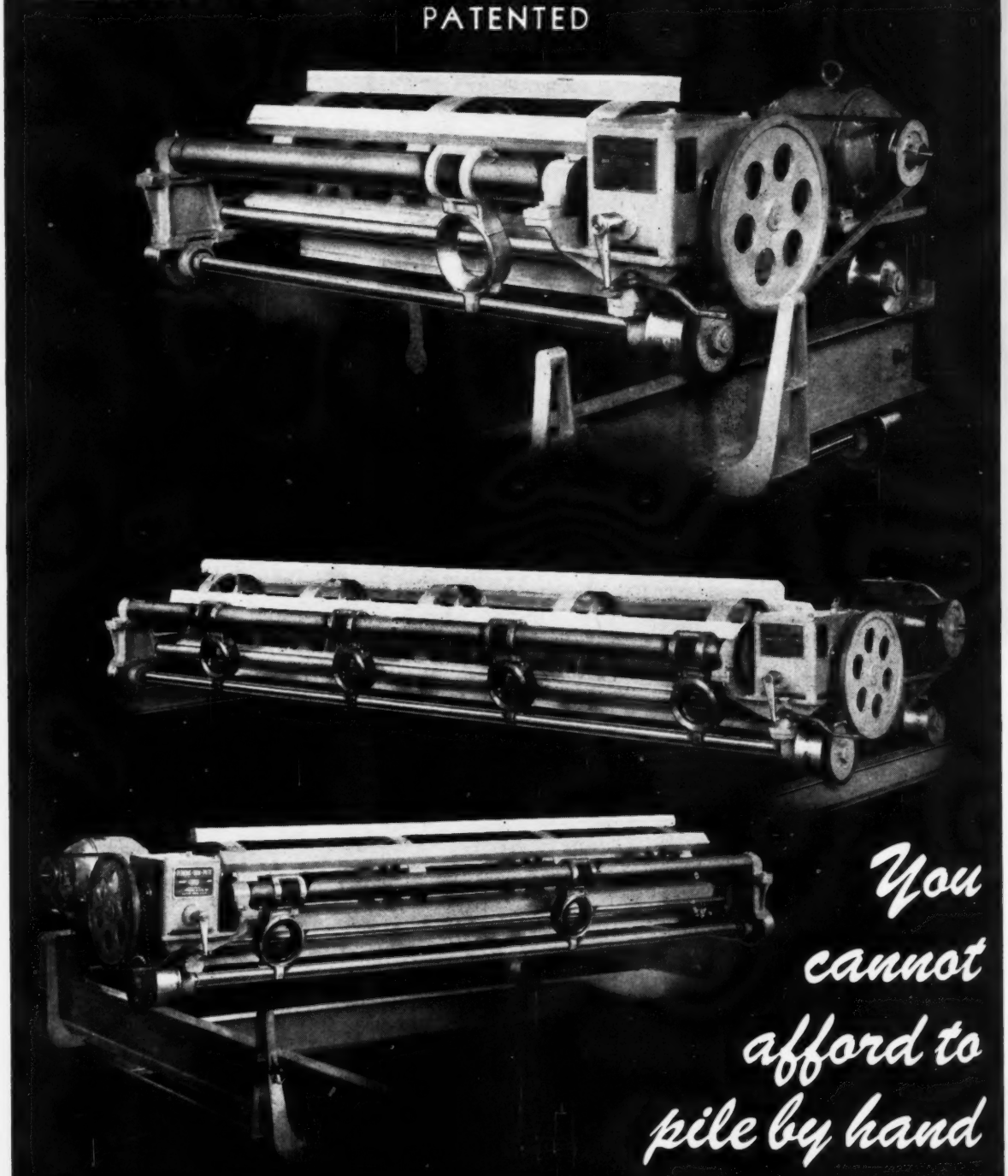

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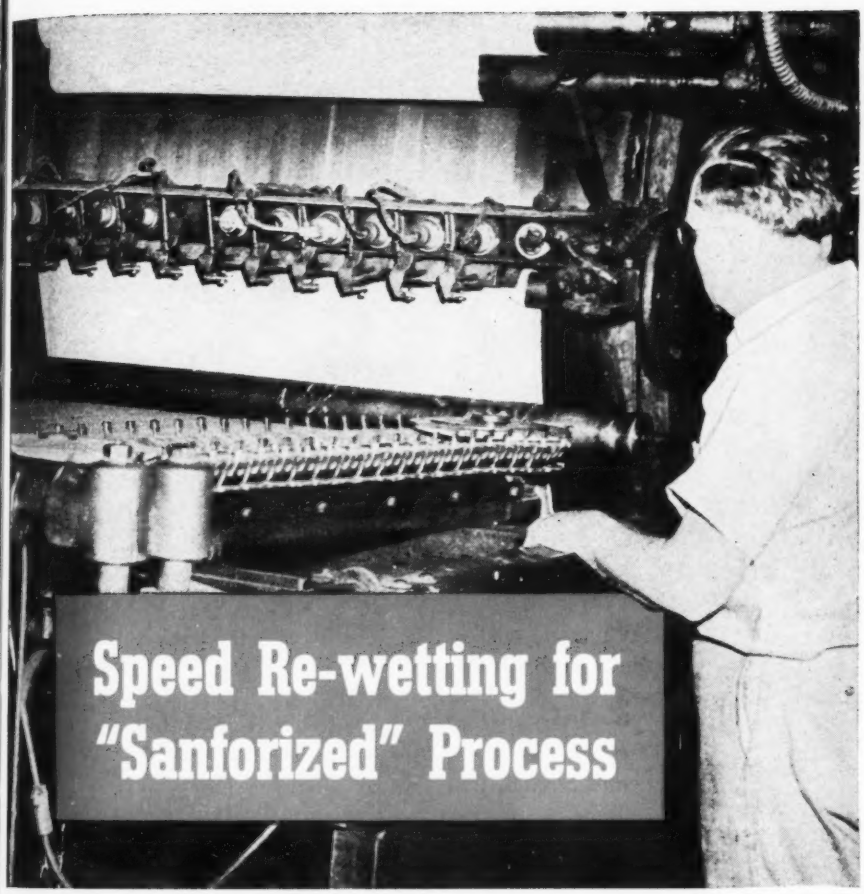

S/V Textile Finishing Oils A and B, Penetrate Uniformly into the Cloth

No need to look any further for the right finishing oils to prepare your cloth for shrinking to the "Sanforized" standard!

S/V Textile Finishing Oils A and B, have proved their superiority in such fabrics as twills, drills and denim, as well as in the lighter materials.

The reason: These oils form stable emulsions that penetrate uniformly throughout the cloth so that the cloth uniformly and quickly absorbs moisture as it passes through the conditioning units of the Sanforizing unit. S/V Textile Finishing Oil B is especially recommended for incorporation in starch mixtures when the cloth is to be Sanforized.

S/V Textile Finishing Oils A and B, are highly resistant to oxidation and discoloration. They are permanently free from objectionable odors. Ask your Socony-Vacuum Representative for advice about applications.

Better, Lower-Cost PROCESSING for ALL Textiles

WOOLENS
S/V Woolrex Oils

Improve carding and spinning. Scour out easily.

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WORSTEDS
S/V Worstex Oils

Lubricate stock uniformly, improve spinning.

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WATER REPELLENTS
S/V Fabrisecs

Give inexpensive water repellency.

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FINISHING
S/V Finishing Oils

Plasticize starch mixtures.

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SANFORIZED PROCESS
S/V Finishing Oils

Insure quick, uniform re-wetting during sanforized processes.

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RAYON PROCESSING
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Lubricate, soften and delustre rayon fibers.

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Special Oils, Waxes

Provide waterproofing, lubrication and softening.

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Prevent fungus growth and increase fabric life.

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Hooker Sulfides... Free from Heavy Metal Salts... Are Safe Reducing Agents

The high quality of Hooker Sodium Sulfide and Sodium Sulfhydrate—their comparative freedom from heavy metal salts makes them particularly valuable to dye chemists for selective reduction of one of several nitro groups in the same molecule.

For Preparation of Dyes

Because of their low iron content, these Hooker Sulfides are being safely used in the preparation of such products as Para Aminophenol, certain Anthraquinone dyes, including Acid Nitro Compounds, Acid Alizarin Blue SE, Developed Dyes, Rapidogen Dyes and Intermediates (Fast Color Salts).

Eliminates Settling and Filtering Sulfide Solutions

The high purity of the Hooker Sulfides also minimizes and in some cases eliminates the need for settling, decanting or filtering of the sulfide solutions.

For Removing Excess Sulfur

Hooker Sulfides are also extensively used to introduce sulfur in dye manufacturing and as a solvent to remove excess sulfur from dyes made by a sulfur fusion.

You can improve your products, save time, and lower costs with these Hooker Sulfides.

Sodium Sulfide, Na_2S, *a light yellow colored solid in flake form, soluble in water, slightly soluble in alcohol, insoluble in ether.*

Analysis

Sodium Sulfide	60 to 62%
Sodium Chloride	1.5% Max.
Other Sodium Salts	2.0% Max.
Iron	8 ppm Max.
All other metals	1 ppm Max.
Water of crystallization	36.5 to 34.5%

Shipping Containers, Drums 90 and 350 lbs. net.

Sodium Sulfhydrate, NaSH, *a light yellow colored solid in flake form. Soluble in water and alcohol, insoluble in ether.*

Analysis

Sodium Sulfhydrate	70 to 72%
Sodium Hydroxide	0%
Sodium Sulfide	1 to 2%
Sodium Chloride	1% Max.
Other Sodium Salts	1% Max.
Iron	5 ppm Max.
All other metals	1 ppm Max.
Water of Crystallization	28 to 26%

Shipping Containers, Drums 90 and 350 lbs. net.

Other Hooker chemicals used in the manufacture of dyestuffs, as intermediates, mordants, catalysts and solvents are listed in Hooker General Products List of nearly 100 chemicals. A request on your letterhead will bring a copy.

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NIAGARA FALLS, N. Y.

New York, N. Y. Wilmington, Calif. Tacoma, Wash.

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Caustic Soda
Muriatic Acid
Ferric Chloride
Paradichlorbenzene

HOOKER CHEMICALS

8384

Protect acetate colors
from Gas and Fume Fading

VELVAMINE GF

Produces a soft mellow finish!

Velvamine GF is a blend of amines and softeners designed to protect acetate colors from gas or fume fading. It resists removal by drycleaning and, when used on mixed fabrics, has a minimum effect on the shade and light fastness of the direct colors

Velvamine GF produces a soft, full hand and does not affect the appearance of the treated fabrics.

Velvamine GF is compatible with resins, gelatine, glue, starches, dullers and similar finishing compounds.

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Lyndhurst • New Jersey

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Eternalure

resin finishes

for

Nylons

ETERNALURE DB

For dulling and increased snag resistance.

ETERNALURE 25

For improving body and snag resistance.

The use of the above finishes in the proper combinations insures hosiery of improved appearance and wear.

Eternalure Resin Finishes are water dispersions of insoluble resins, especially "tailored" for application to nylon hosiery.

There are no toxicity or inflammability hazards in their use and may be applied without modification of existing equipment and in rotary or paddle machines in the same manner as conventional finishes.

Eternalure Resin Finishes tighten and clarify the stitch. They impart increased body and snag resistance so that the hosiery may be handled with a minimum of irregulars. The appearance and hand of the hose is considerably bettered.

Write for demonstration.

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JACQUES WOLF SYNTHETIC DETERGENTS

for every textile purpose

✓ **ORATOL S POWDER (Sulphated Amide)** — For print wash, boil-off or any dyehouse job requiring good cleansing and emulsifying ability with lasting foam.

✓ **SELLOGEN A S CONC (Aryl Alkyl Sulfonate)** — For instantaneous wetting.

✓ **ORATOL L-48 (Sulfonated Amide Compound)** — Very effective detergent paste; greater detergency than soap and priced to give more economical results.

✓ **SELLOGEN C (Higher Alcohol-Ester Compound)** — High wetting and detergent properties; not affected by hard water or metallic salts; for scouring, dyeing, finishing. Also for emulsifying in other processes.

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Announcing

THE NEW KARBATE
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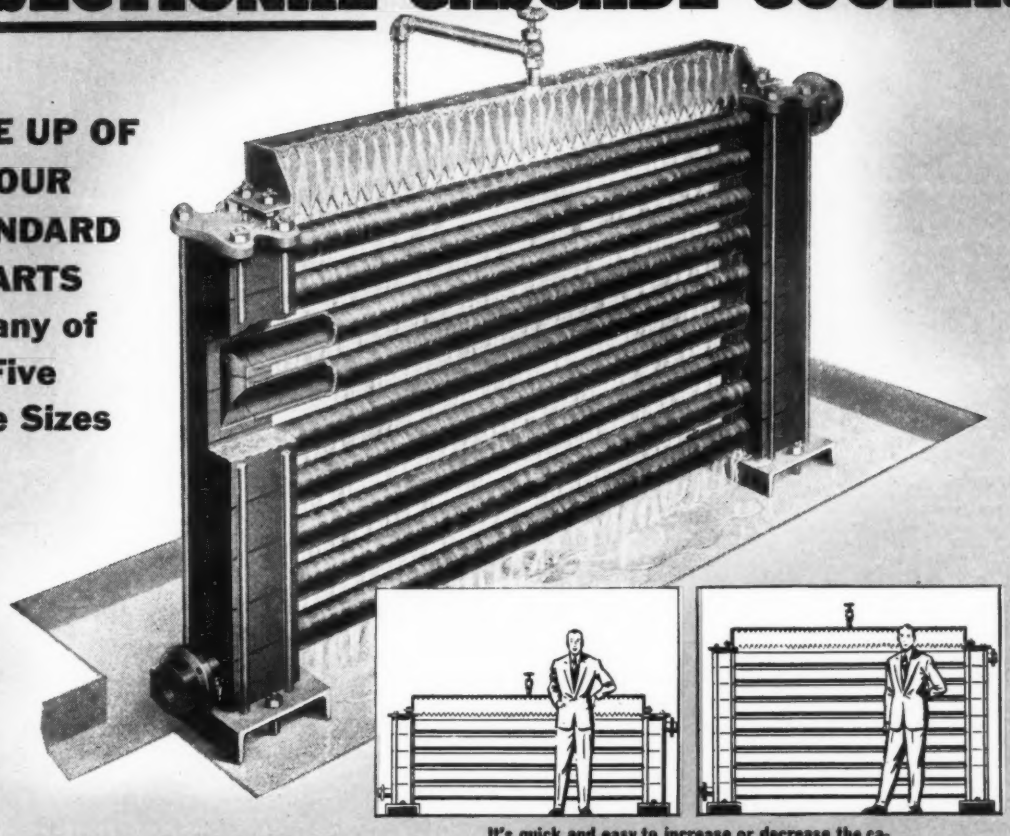
SECTIONAL CASCADE COOLER

MADE UP OF FOUR STANDARD PARTS In any of Five Pipe Sizes



It's quick and easy to increase or decrease the capacity of your "Karbate" Sectional Cascade Cooler.

HERE'S a cascade cooler that you can order from stock to suit your particular process needs. Its interchangeable sections make construction—and additions or subtractions—a quick and easy matter.

Nine-foot-long, single-pipe "Karbate" cooler sections are stacked to form a series flow vertical bank. The compact joint construction makes possible close pipe spacing, and ends the need for redistribution baffles. Also, no external supports are necessary. Maximum effective external areas: about 120 sq. feet in all five pipe sizes in the maximum recommended cooler height of six feet.

Gaskets are of synthetic rubber or of asbestos composition, as desired. A standard steel water distributor is mounted atop the steel tie rod assemblies.

Has many uses! Made of "Karbate" impervious graphite material, the Sectional Cascade Cooler is ideal for efficient cooling of almost all acids, caustics, and organic solvents at pressures up to 75 lbs. p.s.i., and temperatures up to 338° F. With minor changes in applying the cooling water, gases well above this temperature can be handled.

For engineering details on this Sectional "Karbate" Cascade Cooler, ask our nearest Division Office for a copy of Bulletin M-8807.

The words "National" and "Karbate" are registered trade-marks of National Carbon Company, Inc.

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"Don't ask me to accept a substitute—I want my nylons scoured with Alkamine K-50".

Alkamine K-50 is a powerful detergent ideally suited for nylon, rayon, and rayon welt nylon hosiery . . . equally effective on cotton skeins and package yarns, and cotton piece goods especially when used with spun rayon.

Wetting-Out: **Alkamine K-50 gets to the center of the fiber with amazing speed.**

Scouring: **Fabrics are cleaner, clearer in half the time ordinarily required.**

Dyeing: **Dyeing results are better because Alkamine K-50 prevents lime soap deposits which cause streaky dyeing. Colors are brighter.**

Finishing: **The luster on finished goods is fresh and appealing, never dull or lifeless.**

Try new and improved Alkamine K-50—in paste form for difficult scouring and faster wetting out. Let us serve you.

ALKAMINE K-50

Amalgamated Chemical Corp., Phila. 34, Pa. :: Southern Representative: Robert A. Bruce, P. O. Box 35, Greensboro, N. C. : : Makers of a complete line of Textile Finishes, Dyeing Agents, Penetrants and Softeners.

MORE LIQUOR LESS PRESSURE

. . . and you have Faster, More Uniform Dyeing

The larger the volume of dye liquor moved through a package of yarn and the lower the pressure developed . . . the faster and more uniform are the dyeing results! That entirely new principle in package dyeing was first introduced in the SMITH-DRUM Package Dyeing Machine just a few years ago. And it has completely revolutionized package dyeing.

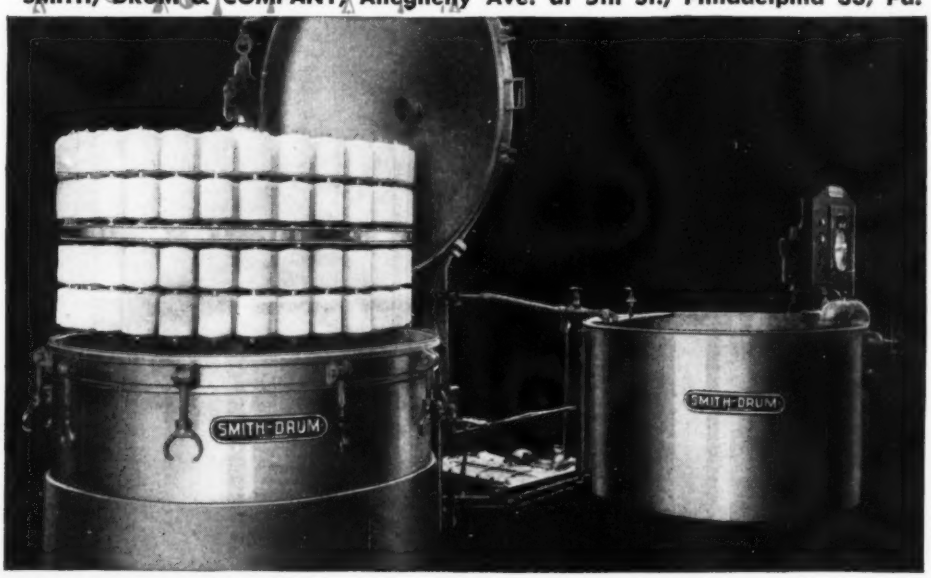
A new type of package carrier and a new fluted spindle design permit a far greater flow of liquor through each package than the conventional types of machines. This increases the speed of dyeing and results in greater uniformity.

Other advancements include a visual control panel, patented backwash feature, automatic reversing valve to change direction of flow and calibrated block-off tubes. Complete details will be sent to you upon request.

SMITH, DRUM & COMPANY, Allegheny Ave. at 5th St., Philadelphia 33, Pa.

Send for a copy of this Booklet

Four times winner of Army-Navy "E"



SMITH-DRUM PROCESSING MACHINERY

for hosiery dyeing, skein dyeing, package dyeing, beam dyeing, piece goods dyeing, package extracting, package drying, skein mercerizing, warp mercerizing, hosiery inspection.

For a cleaner textile world . . .

SULFRAMIN DT POWDER*

In a world that grows cleaner day by day, textile mills are depending more and more upon the chemical magic of Sulframin DT. For Sulframin DT is an unusually efficient detergent; and is very economical besides.

Chemically classified as an alkylaminosulphate, Sulframin DT functions effectively in almost every phase of boiling off and drying procedure. As an emulsifier and foaming agent it performs ideally; it dissolves readily and blossoms into rich suds even when diluted by ten thousand parts of water. Equally important, the efficiency of Sulframin DT isn't lessened when used in hard water.

Moreover, Sulframin DT is unaffected by the presence of lime and magnesium salts; it resists both acids and alkalies; and even after long storage, it does not deteriorate. Sulframin contains no soap; consequently rancidity and stains —so common when soap is used as the emulsifier —no longer present a textile problem. And in the dyeing industry concerned with processing rayons and acetates, the thorough dispersing qualities of Sulframin DT are utilized to particular advantage.

If you require more detailed information, phone or write!

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**Sulframin DT is an exclusive formula—U. S. PAT. PENDING • Sulframin DT Reg. U. S. Pat. Off.*

EASTONE BLUE BGF

For Plain or Dischargeable Dyeing of Acetate Rayon Fibers, Fabrics, and Blends

EASTONE BLUE BGF, a highly soluble azo dyestuff, dyes acetate rayon medium-bright shades of blue which are highly resistant to atmospheric gas fading. This Eastone dyestuff penetrates and levels at a somewhat lower temperature than azo blues previously offered, and has excellent build-up properties for both jig and box dyeing at temperatures which range from 180°F to the boil.

Eastone Blue BGF is one of the few blue acetate dyestuffs which are readily dischargeable. It has superior wash fastness and resistance to dry cleaning, ironing, crocking, and perspiration. In cross-dyeing, it leaves viscose and cotton white. On combinations of acetate with silk and with wool, this dye produces bright shades of blue.

Eastone Blue BGF is one of an expanding line of Eastman Acetate Dyestuffs available in a wide color range for cellulose acetate rayon fibers and fabrics. Additional data on these dyestuffs and their use may be obtained by sending your inquiry to: TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

Eastman

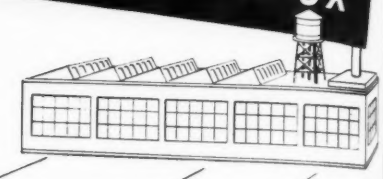
ACETATE DYESTUFFS

An Oil for Sanforized Finishing that is

...NON-OXIDIZING

...NON-STAINING

Improved EMERY Twitchell Oil 3x



MILL PROVED FOR:-

1. Fast, uniform rewetting
2. Retention of rewetting properties
3. Freedom from oxidation and staining
4. Low volatility—no volatile coupling agents
5. Lubricity imparted to Sanforizing shoes
6. Absence of gumminess in or deterioration of Palmer blanket
7. Compatability with starches, gums and other ingredients of finishing formulae
8. Low cost

Emery's Twitchell Oil 3X is recommended also for increasing the water absorbency of toweling, wiping cloths, paper-maker's felts, etc., and for all regular finishing operations.

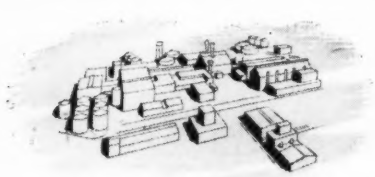
Other Emery Products for Textile Industry

1. **STEARIC ACID**—an ingredient in Stearic-base softening and finishing formulae which resist oxidation, yellowing and rancidity.
2. **OLEIC ACID** (Red Oil)—a high quality oleic acid for general usage in textile manufacturing.
3. **OTHER TWITCHELL OILS—**

681, 685 & 687 — For Rayon coning, throwing, warp-sizing and crepe-yarn soaking.

304 — For softer hand in sanforized and regular finishing.

MC & 308 — For lubrication of wool and worsted fibres and yarns in carding, combing, spinning, weaving and knitting.



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STEARIC ACID • OLEIC ACID • ANIMAL AND VEGETABLE FATTY ACIDS • TWITCHELL PRODUCTS • PLASTICIZERS

Keep ahead—

of weather with DRAX -treated sportswear!

Trademark Reg. U. S. Pat. Off.

When rain hits the golf course, it's comforting to be wearing DRAX-treated sportswear. DRAX makes fabrics resistant to showers . . . keeps them fresh and clean longer . . . makes them resist perspiration. This is a fabric-*plus* that customers really appreciate, whatever the weather.

You'll find that DRAX gives superior results in use. Tests conducted by an independent laboratory show that DRAX produced a water-repellency exceeding U. S. Army specifications for initial spray rating. It is easy and inexpensive to use, and may be applied to *any* textile.

DRAX is made by the makers of Johnson's Wax. It is a simple wax emulsion, non-flammable, and stays stable in solution. Textile mills already using it find that DRAX adds a profit-plus without being difficult or expensive to use. It will pay you to find out about DRAX NOW!

This DRAX tag is a sign of plus *value!*

S. C. JOHNSON & SON, INC.
Fabric Finishes Division
Racine, Wisconsin
In Canada, S. C. Johnson & Son, Ltd.
Brantford, Ontario

DRAX **is made by the makers of Johnson's Wax (a name everyone knows)**

NAME IT . . . AND Olate* HAS IT

Mention a quality that you consider essential in a soap for processing the particular fiber or fabric you handle, and you're almost certain to find that Olate has it.

Safety? No other soap rates higher than Olate on this score. Pure, neutral, and uniform in quality, Olate treats every type of fiber gently.

Speed? Because of its low titer and thin flake form, Olate dissolves fast, penetrates fibers fast, cleans fast, rinses fast. You get ample protection with Olate against odor development and fabric discoloration.

Efficiency? Olate's performance record in countless textile mills during the past decade speaks for itself. In the wartime period now ended, when mill production was at peak, Olate helped many a mill to avoid costly, time-wasting tie-ups and rejects.

* **There's a place in *your* mill where Olate's processing results can more than pay their way. Try Olate.**

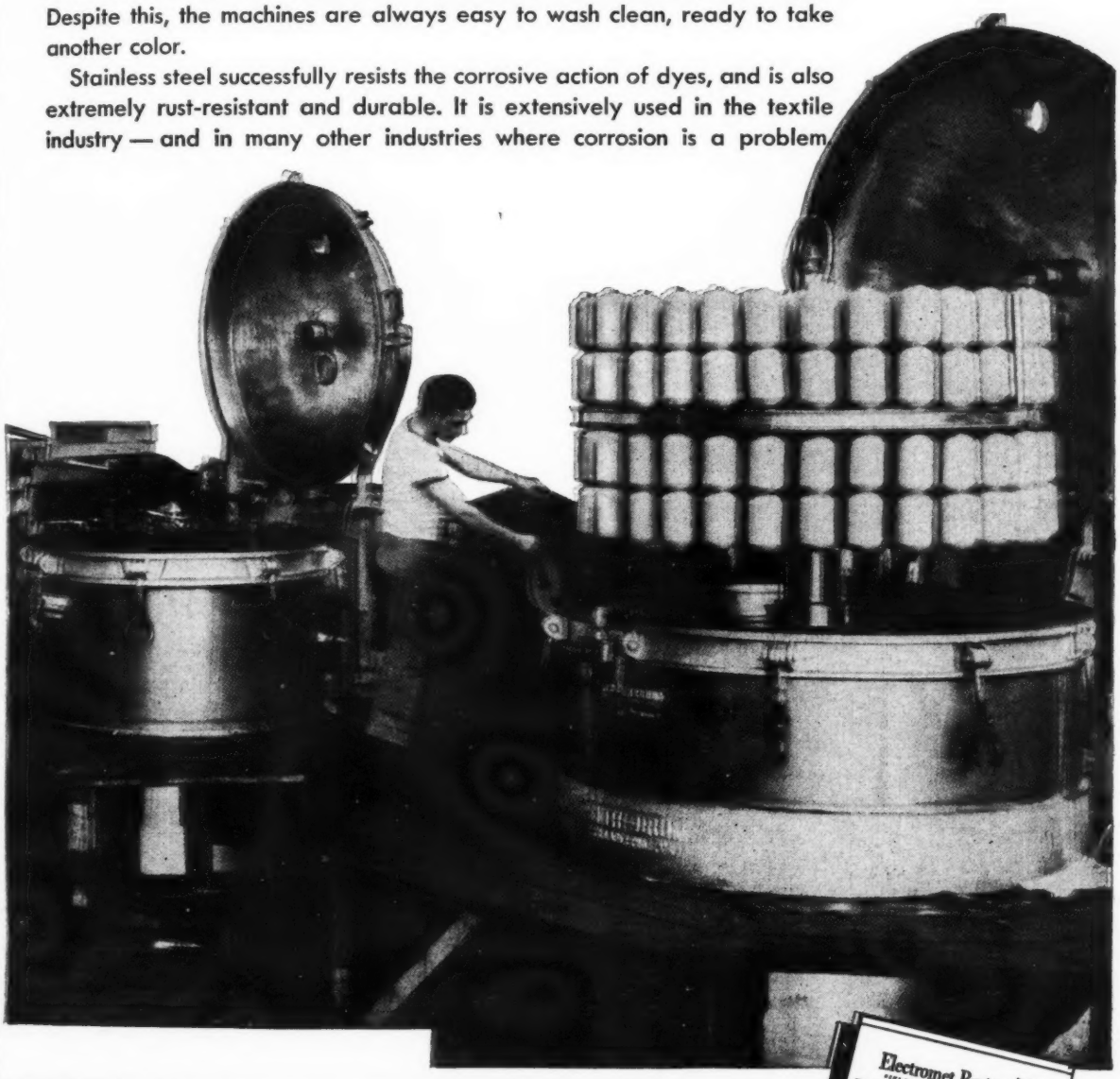
SAFE AND EFFICIENT FOR EVERY TEXTILE SOAP USAGE

Procter & Gamble

Stainless Steel
Resists Corrosive Dyes

These stainless steel package-dyeing machines are typical of many that have been in use for years. Each handles both alkaline and acid dyes. Despite this, the machines are always easy to wash clean, ready to take another color.

Stainless steel successfully resists the corrosive action of dyes, and is also extremely rust-resistant and durable. It is extensively used in the textile industry — and in many other industries where corrosion is a problem.



Other uses of stainless steel are described in ELECTROMET REVIEW, published by ELECTRO METALLURGICAL COMPANY, a Unit of UNION CARBIDE AND CARBON CORPORATION. ELECTROMET does not make steel, but produces the ferro-alloys used in its manufacture. If you need this complimentary publication, write to ELECTRO METALLURGICAL COMPANY, 30 East 42nd Street, New York 17, N. Y.

Perfection is a lot of little things

The creative artistry of a talented designer plus the skilled needlework of a fine tailor was not enough to achieve the rare perfection of this exquisitely tailored sport coat. For in the fashion field, perfection is made up of a lot of little things.

That explains why so many of America's leading mills, converters, finishers and dyers have turned to Colgate-Palmolive-Peet for high-quality wetting, fulling, scouring and dispersing agents.

There is a C.P.P. soap or synthetic detergent for every type of fabric—for every processing problem. Ask your local Colgate-Palmolive-Peet representative for details. Or, write to our Industrial Department.

COLGATE WHITE SOAP FLAKES
ARCTIC CRYSTAL FLAKES
BADGER FLAKES
ARCTIC SYNTEX "A" AND "T"
COLGATE FORMULA 10

Colgate-Palmolive-Peet Co. Jersey City 2, N. J. • Atlanta 3, Ga. • Chicago 11, Ill. • Milwaukee 4, Wisc. • Kansas City 3, Kans. • Berkeley 2, Calif.

Chemical reactions that unlock the rainbow's spectrum from stygian tar oil can be defined precisely. But techniques of producing aniline dyes and applying them with unfailing accuracy of hue and shade — these are elusive as the subtle lines of a couturier's creation.
Oldest and only American producer of every class of aniline dye and color, National Aniline has accumulated a vast reservoir of dye application experience in every field where color is used . . . available through nearby National Technical Service.
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ALUMINUM CHLORIDE SOLUTION?

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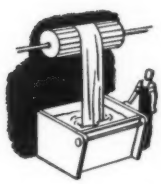

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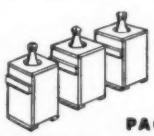

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SURFACE ACTIVE COMPOUNDS

*Their Use in Textile Operations**

DR. HUGH H. MOSHER

Vice President in Charge of Textile Development, Onyx Oil & Chemical Co.

SURFACE active compounds may be defined as agents which, when dissolved in a liquid, usually water, lowers surface and interfacial tensions and tends to collect at surfaces and about non-polar substances. You are all familiar with them. They constitute the wetting agents which paste up dyes, the detergents used to eliminate soil from textiles, the leveling agents employed to promote color uniformity, the emulsifying agents required to disperse oils and pigment particles and the softening agents used to impart fabric softness and plasticize sizes. Although the agents used to accomplish these diverse purposes vary, they all possess a common generic chemical configuration.

Knowledge regarding the *modus operandi* of surface active compounds is still limited, involved and complex. It is customary to record results rather than explain them and surface active compounds are usually described under such captions as synthetic detergents, wetting, penetration and emulsifying agents.

Surface active compounds had but limited industrial application up to a decade or two ago. Soaps and sulfated oils were the only major representatives of this family and they possessed inherent defects that gave them only a limited field of usefulness. Soap was used chiefly to remove oils and grease from materials and the type of sulfated oils, then available, were valuable chiefly as softening agents and emulsifying agents for oil. The development of synthetic surface active compounds, freer from the stability limitations of soap and possessed with greater effectiveness has extended the application of these substances in industry. Today they find utilization in practically every industry and in almost every industrial operation which involves wet processing. They are in use in such diverse applications as ore flotation, electrolytic plating, cement formulations, apple washing and, of course, in textile cleaning and dyeing.

The chemical structure of surface active compounds is well known. In general they are more or less complicated molecules composed of two essential parts. One end of the molecule contains a highly mobile, water soluble radical that is attracted by water and repelled by fats, waxes and non-polar substances. This radical is referred to as "hydrophilic." The other end of the surface active compound contains a long chained chemical fatty radical that is repelled by water, attracted or absorbed by fats, waxes and non-polar substances and tends to form thin viscous films about anything that it can wet. This radical is called "Hydrophobic."

A chemical union of such contrasting radicals results in the formation of surface active compounds.

The *modus operandi* of surface active compounds in aqueous solutions can be understood by a brief review of some of the laws of organic chemistry and a consideration of "hydrophobic" and "hydrophilic" radicals.

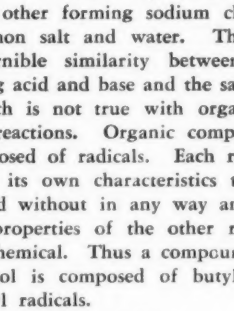
It is often believed that when two substances react to form a new compound, the product of reaction bears but little resemblance to the reacting chemicals in so far as chemical and physical properties are concerned. Hydrochloric acid and sodium hydroxide neutralize each other forming sodium chloride or common salt and water. There is no discernible similarity between the reacting acid and base and the salt formed.

Such is not true with organic chemical reactions. Organic compounds are composed of radicals. Each radical imparts its own characteristics to a compound without in any way annihilating the properties of the other radicals in the chemical. Thus a compound such as butanol is composed of butyl and hydroxyl radicals.

$$CH_3.CH_2.CH_2.CH2.OH = CH_3.CH2.CH_2.CH_2 + OH$$

Butanol — *Butyl* — *Hydroxyl*

Each imparts its own characteristics to the compound. It is possible by various means to replace one of the hydrogen atoms attached to the alpha carbon atom by an amino group and obtain amino butanol.



The properties of the butyl and hydroxyl radicals persist after the conversion but amino characteristics have been added to the new compound.

This fact suggests that one of the radicals in a surface active compound must possess the inherent characteristics required to produce surface activity. These characteristics are an ability to orient the molecule about non-polar materials and surfaces, to dissolve or be absorbed by oils, fats and solvents and to produce tough viscous films. Such properties are imparted to the molecule by the "hydrophobic" radical and the "hydrophile" acts largely as the motor, the solubilizing medium, to draw the "hydrophobe" into solution.

In many respects a hydrophobe acts in aqueous solution like a lubricating oil does on metallic surfaces.

If a drop of lubricating or mineral oil is placed upon the surface of a metallic sheet the oil spreads over the metal and in a short time envelopes the metal in a tough, viscous film. The film possesses extraordinary adhesive and film strength. It is almost impossible to completely remove the oil from a metal by wiping it with a cotton cloth. The excess of oil may be removed but the metal still retains a mono-molecular oil film. That principle is employed in protecting tools and delicate instruments from rusting.

The strength of the oil film is shown by the fact that a properly oiled shaft does not come in contact with its box but revolves on a thin film of lubricant precisely as if it were oil balls of a ball bearing.

The oil also possesses penetrating and wetting power. It enters all irregularities on a metal, enters capillaries, crevices and cracks and even tends to pry a metal apart at points of fracture.

If the metal contains rust and tarnish, adherent soil and dirt, and these extraneous substances are not too deeply imbedded, the mineral oil envelopes the impurities encasing each particle in an oil film. The soil no longer adheres to the metal but is separated from it by an oily film.

Thus if we should select a strip of rusty or soiled metal and dip it in a

* Presented at meeting, Philadelphia Section, January 18, 1946.

lubricating oil, the extraneous matter can be rubbed from the surface of the metal after standing for a few minutes and a clean surface results.

Lubricating oils are not all equally serviceable. The lighter oils possess the better wetting and penetrating properties whereas the heavier oils produce the stronger films and act as better cleaners and emulsifying agents.

The mineral oils act on metallic surfaces in much the same way that surface active compounds do in aqueous solution. They form tough viscous films, penetrate and wet, act as soil removers and emulsify certain classes of colloids.

The lighter mineral oils are long chained hydrocarbons containing some 12 or 14 carbon atoms, whereas the heavier oils are somewhat larger molecules containing up to 18 or 20 carbon atoms in the form of a straight chain. The chains are often adorned with numerous side chains and other complexities of structure but that is not a matter for consideration in our study of surface activity.

We are also indebted to the lubricating chemists for a number of other interesting facts and these are that unsaturated groupings in the hydrocarbon chain reduces its lubricating value.

Of all the chemicals in common use those straight chained organic hydrocarbons containing between twelve and eighteen carbon atoms produce our most effective lubricants.

Certain physical-chemical considerations indicate that these hydrocarbons should constitute our most effective hydrophobes.

The solubilization or attachment of solubilizing radicals to these hydrocarbons has been the objective of synthetic chemists for the past few decades. Its successful accomplishment has resulted in improved surface active compounds and the birth of modern surface active chemistry. Few of our surface active compounds are, even today, made directly from mineral oils or hydrocarbons. The hydrocarbons are rather inert chemically and react with but few reagents. Most are produced by replacing or modifying the "hydrophile" that nature had inserted onto some hydrophobic configuration usually a fat or oil.

Nature is still our greatest organic synthesist. It is she who first attached hydrophiles onto hydrocarbons in her preparation of fats, oils and waxes and it is these products which constitute the precursors of most of our synthetic surface active compounds.

The number of hydrophiles theoretically available for attachment to a hydrophobe are many but comparatively few receive commercial utilization. These include the carboxyl (COOH and COONa), sulfate (SO_4), phosphate (PO_4), amide sulfate $NHSO_4$, poly ethylene $(HC{=}CH)_x$ (with an O bridging the two carbons), poly glycols $\begin{bmatrix} CHOH \\ CHOH \end{bmatrix}_x$, the amines, primary, secondary, tertiary and quaternary; and sulfonium radicals.

The hydrophiles function as the solubilizing agent or motor which draws or carries hydrophobes into solution.

Surface active compounds seem paradoxical compounds, composed, as they are, of dissimilar radicals, each attempting to dominate the characteristics of the substance. The hydrophobic moiety which is water-repellent attempts to collect on surfaces and on and about any substance that it can wet in much the same way that lubricating oils react on metallic surfaces. Simultaneously the hydrophilic portion, which may be repelled by such materials, attempts to distribute itself uniformly throughout any aqueous medium, carrying with it the hydrophobe and any substance attached thereto. If either of the fractions predominate in effectiveness the characteristics of its partner may be so masked and obscured that its properties from a practical standpoint are not important.

The value of a surface active compound is determined by a proper balance of its hydrophobic and hydrophilic properties. This balance is often difficult to accomplish and may be upset by the presence of extraneous materials.

In order to act in aqueous solution the hydrophilic terminal must have sufficient solubilizing action to convey the hydrophobe into solution. If its action predominates slightly, and the hydrophobe possesses the proper inherent characteristics, a wetting or a penetrating agent results. A more uniform balance results in the production of a synthetic detergent, whereas materials with a preponderance of hydrophobic characteristic, with just enough hydrophilic properties to solubilize the compound, produces our softening, emulsifying and dispersing agents.

It might be added that just as dodecane acted as the best mineral oil for penetration and wetting on metallic surface so surface active compounds derived from a lauryl hydrophobic radical functions are our best wetting and penetrating agents. The stronger and more adhesive myristyl, cetyl, and stearyl hydrophobes constitute the best potential radicals for detergency and emulsification, just as the heavier mineral oils produce better lubricants and emulsifying agents.

Last spring I spent several months in the American North West and saw great forests being hewn. The trees for the most part had grown on potentially rich agricultural land and as much of the land was in demand for farming purposes, the tree stumps, after a certain period of conditioning, were being removed. This was being accomplished by great tractors to which diverse grubbing equipment was attached. The devises for uprooting the stumps varied. In some cases great harpoons with serrated points were driven into the roots whereas in other cases cables were encircled about the stumps. When the removal equipment was firmly affixed the loose end of the cables were attached to the tractors, and all that remained of the tree removed and conveyed to a depot. The removal was often an arduous task. Too sharp an initial pull or yank caused the attachments to slip from the stumps; a gradual steady pull usually resulted in an uprooting. Occasionally even the maximum pulling power of the engine was insufficient to remove the tree and other methods of clearance had to be adopted, and I could not but reflect as I saw the program proceeding that I was in a colossal gargantua and watching surface active compounds at work. A striking analogy exists between such substances and the equipment used in land clearance.

The tractor corresponds to the hydrophile of a surface active compound, and its various uprooting attachments to the hydrophobe. Hydrophobes attach themselves to colloids and non-polar bodies in aqueous solutions in much the same way as stump clearance devices, sometimes by entering the non-polar body and sometimes by encircling it in a film. If the hydrophile is too powerful a wetting agent results. This corresponds to the yank of the tractor that breaks or disengages its attachments from a stump. If the hydrophiles and hydrophobes are balanced a detergent results and soil is carried away from a fabric or a material in much the same manner that roots are cleared. Where the hydrophobe overbalances the hydrophile a permanent attachment of a hydro-phobe to a colloid or substance results analogous to a tractor unable to uproot a tree.

The whole subject of surface active compounds is complicated by the fact that although the hydrophobic moiety of the molecule is chemically inert the hydrophile is often highly reactive. It is usually an electrolyte and in solution is not present as a molecule but as an ion, and hence obeys the laws of dissociation.

Two types of ions exist, anions and cations. The former bear negative electrical charges; the latter positive.

When most salts, acids and alkalies en-

ter aqueous solution the molecules no longer exist wholly as such but split into ions which are electrically charged atoms or ions. Each ion bears a different electrical charge.

Thus sodium chloride solutions contain but a modicum of molecules but is composed largely of sodium and chlorine ions.

$$NaCl = Na^{+} + Cl^{-}$$

The ions are highly reactive. Each is attracted to other ions bearing an unlike charge or to other differently charged bodies. Conversely the ion is repelled by similarly charged substances.

Of course the sodium and chlorine ions in a sodium chloride solution are attracted to each other and react momentarily to reform sodium chloride which redissociates. As a result a condition of equilibrium soon results in which the solution always holds a definite proportion of molecules to ions.

Should another solution containing another salt be added to sodium chloride an example of one of the fundamental laws of inorganic chemistry might occur. Silver nitrate, like sodium chloride, dissociates in solution producing silver and nitrate ions.

$$AqNO_3 = Aq^{+} + NO_3^{-}$$

When solutions of the two salts are mixed a system is produced which initially contains sodium, silver, chlorine and nitrate ions. The sodium and silver ions are cationic and are attracted to both the negatively charged chlorine and nitrate group to form, momentarily at least, molecules. The silver chloride molecules are almost insoluble in water and as rapidly as formed precipitate and are removed from solution. Such a reaction is known as double decomposition and may be broadly stated as follows. Whenever aqueous systems containing ions are produced in which a pair of differently charged ions can unite to form an insoluble compound a reaction occurs and the insoluble compound is produced.

Many surface active compounds dissociate in water and hence obey the laws of ionization. The ion bearing the hydrophobic-hydrophilic unit may be either negatively or positively charged depending on the hydrophile, and the charge determines the usefulness of the compound for a particular purpose. According to the charge, surface active compounds are divided into three general classifications, namely: —

1. Anionic Auxiliaries
2. Cationic Auxiliaries
3. Non Ionic Auxiliaries

Surface active compounds, the hydrophiles of which are composed of carboxyl (COOH and COONa), sulfate (SO_4), sulfonate (SO_3) phosphate (PO_4) and amide sulfate ($CONH.SO_4$) groups, are always anionic.

This type of auxiliary was the first synthesized by man and is by far the most important industrially. The soaps, sulfated and sulfonated oils, alcohols, and most of our synthetic detergents belong to this class of compounds.

Hydrophiles composed of complex amines, chiefly quaternary nitrogen and sulfonium radicals produce cationic surface active compounds.

The non ionic surface active compounds differ from the two classes listed above in that they do not form ions in aqueous solution. Hydrophiles composed of polyglycol and polyhydric radicals yield auxiliaries of this class.

Regardless of the type of hydrophile employed in solubilizing a hydrophobe, the behavior of a surface active compound in aqueous solution is much the same. The compound tends to collect on all non-polar bodies within that solution, the hydrophobe aligning itself about or within the extraneous matter whereas the hydrophile may point away from the substance and toward the water. The differences in properties of the members of the three classes of compounds is due to the type or absence of an electrical charge.

The members of each division possess certain inherent characteristic. Some of the more important are:—

1. Anionic auxiliaries tend to form insoluble salts with heavy metallic salts and with complex cations. Conversely cationic auxiliaries are not reactive toward other cationic substances but react readily with anions. Non-ionic surface active compounds are chemically inert, though many are decomposed by strong alkalies and acids.

2. Anionic auxiliaries are repelled by negatively charged colloids but attracted by positively charged substances. Cationic materials exhibit a reverse effect. Non-ionic auxiliaries are inert toward electrolytes.

3. Anionic surface active compounds are often salted out of solution by strong acids and alkalines. Cationic auxiliaries may show far greater stability and some are stable in the presence of concentrated acids, alkalies, and saline solutions. Non-ionic compounds are often hydrolyzed by strong acids and alkalies.

It is not to be supposed that all the members of a certain group exhibit the same sensitivity to precipitation. Soaps are insolubilized by even a trace of lime whereas sulfated fat alcohols shows such resistance that they may be used in hard waters without any loss of effectiveness.

Until the past decade scientists and industry were restricted in their applications of surface active compounds to certain specific fields. They had only the anionic auxiliaries available for use. These are not serviceable for processing cationic substances and positively charged colloids. They also tend to be salted out of solution by strong acids and alkalies and are precipitated by heavy metallic salts.

The development of the quaternary ammonium and non-ionic auxiliaries has greatly extended the usefulness and interest in surface active compounds. Many interesting textile uses have been developed.

Hard water owes its hardness to the presence of lime and magnesium salts. These salts yield cations which react with many anionic surface active auxiliaries to form insoluble curds and scums, which vitiate textile applications. Although many of the newer anionic synthetics are resistant against the concentrations of hardness found in ordinary or even unusual industrial water, few indeed will withstand sea water. As a result nonionic detergents are replacing the older types of marine soaps and detergents for washing textiles in sea water. Cationic dispersing agents are finding application in marine paints and varnishes; fields in which anionic auxiliaries always were poorly adapted.

The anionic auxiliaries are even less stable and soluble in "heavy metallic salt" solutions than in sea water and have proved totally unsuited for employment in many textile operations which involved the use of such salts.

The carbonizing of wool with aluminium chloride has been facilitated by the use of certain cationic wetting agents. Complex silico-fluorides, which were unserviceable for moth-proofing wool because of poor penetration, have been rendered superior moth-retardants by the addition of some of the members of the cationic wetting family.

Much of the ammoniacal copper compounds used in "rot resisting" sand bags for army use during the war were applied to the jute without the benefit of a penetrating agent. A small addition of an especially developed cationic wetting agent to the copper solution was found to enhance the value of the treatment and produce better penetration and less loss of copper during subsequent leaching and weathering.

The mordanting of fabrics by aluminium and chrome salt can be facilitated by some cationic or non-ionic auxiliaries. Better color uniformity and brighter shades attend the subsequent dying operation.

The tin weighting of silk formerly constituted an important operation in silk processing. The operation was conducted without the use of either a wetting or penetrating agent as no auxiliary was then available which was resistant against precipitation in the tin chloride solution. Certain of the newer cationic wetting synthetics are completely soluble in such liquors and if the operation assumes importance in this post war era, we can expect some important modifications in this process through the use of these auxiliaries.

Surface active compounds are employed in almost every wet processing operation to which textiles are subjected. These include:—

1. The preparation of those oil emulsions used to facilitate throwing and weaving (rayon) and carding and combing (wool).
2. As detergents to free materials from throwing oils, dirts, greases and other extraneous matter.
3. As dye auxiliaries to promote the development of level color shades and induce the penetration of color into tightly twisted yarns.
4. As auxiliaries in the finishing of textiles.

Surface active compounds may also be used in such operations as wool carbonizing, bleaching and the mercerization of cotton.

OIL EMULSIONS

Textile fibers as delivered to the textile mill are too dry and harsh to convert into yarns and fabrics. The adverse condition of the yarns is usually corrected by the use of lubricating oils, usually applied as an oil emulsion. This involves the use of an emulsifying agent. Such an agent is almost always surface active.

Emulsifying agents are usually surface active compounds balanced to secure emphasis of the hydrophobic side. Such a compound is more easily secured with the non-ionic hydrophiles. The anionic emulsifying agents are most generally used however for oil dispersing purposes due to their lower cost of production. Cationic emulsifying agents have been but rarely used commercially even though they possess distinct aspects of superiority.

When properly balanced the three types of auxiliary are about equally effective in emulsifying mineral oils and ordinary organic solvents. The hydrophobic portion of the compound orients itself about and/or in the oil droplets whereas the hydrophile protrudes from the surface pointing toward the water medium into which the oil is suspended. If the hydrophile is electrically charged each oil droplet acts and functions as an electrified colloid.

Most textiles are anionic. As a result the oil droplets in a positively charged oil emulsions are drawn to the textile and deposited. Conversely negatively charged oils are repelled by textiles whereas oils emulsified with non-ionic auxiliaries are indifferent to the presence of the textile.

Oil exhaustion tests conducted in the writer's laboratory with stable oil emulsions prepared with representatives of each type of emulsifying agent have demonstrated that exhaustion can be secured with only the cationic type. In fact the conventional anionic type of emulsifying agent always results in a negative oil absorption.

The cationic agents are themselves excellent lubricants and, when the price differential between the three types is narrowed, cationic emulsifying agents may assume greater industrial importance.

It might be added that oils emulsified with anionic agents are usually exhausted by the use of unstable emulsions. Such an emulsion usually results in an uneven deposition of oil on textile yarns and fibers.

DETERGENCY

Most of the synthetic detergents are balanced so as to secure the proper hydrophilic-hydrophobic effectiveness. The hydrophobe must possess sufficient strength to hold fat, waxes and miscellaneous soil, while the hydrophilic portion of the compound must be effective enough to carry the hydrophobe and any extraneous matter attached thereto into solution and maintain it in a dispersed state. Most synthetic detergents are increased in efficiency by the presence of alkali and some by added adjuvants such as Bentonite and carboxymethyl cellulose.

Detergents may be either anionic or non-ionic but not cationic. Almost all textiles are anionic and in consequence absorb cationic substances from solution. As a result cationic auxiliaries even though balanced to secure detergency are absorbed from solution by textiles and are unable to clean except under very special conditions.

Wool, when placed in solutions more acid than its isoelectric point, acquires a positive electrical charge and becomes cationic. It might be expected that under acid conditions properly balanced cationic auxiliaries would act as efficient detergents. Such does not appear to be the case. Even though the wool is cationic it appears to possess an ability to combine with cationic auxiliaries, and very little success has attended attempts to clean wool with such materials.

Some success has resulted in acid scouring with the non-ionic auxiliaries, though even these detergents have not proved as effective as might be expected.

The non-ionic auxiliaries have, however, assumed considerable importance in the washing of prints. Print colors are often removed by anionic detergents during the washing operation and tend to stain whites and pastel shades. A temporary fixation of the color during the washing operation is often a processing "must". This is often secured by the use of metallic salts, formaldehyde and other metallic and organic compounds. Many of these combine with the conventional anionic detergents forming insoluble scums which adhere to and vitiate prints. These scums and "spot" formations are prevented by substituting the non-ionic detergents for the anionic.

Most of our synthetic detergents are anionic. Hydrophobes are more easily balanced with anionic hydrophiles to produce a detergent configuration than with non-ionic. It is claimed that in the dying days of the late war that Germany evolved non-ionic detergents of very superior quality. This assertion has not as yet been scientifically verified.

Although many of the newer synthetics surpass soap in many of the functions of cleaning and processing textiles but few surpass it in whiteness retention during washing. This factor is of importance in a few operations. Many colloids have been used to augment this deficiency. Among the most effective is the colloid carboxy methyl cellulose. Just what influence this colloid will have on textile washing in the future is still too easy to predict.

DYEING

The types of dyestuffs used in coloring textile fabrics and the methods used in processing are so diverse that only generalities regarding the employment of surface active auxiliaries will be discussed.

Only the anionic surface active compounds are ordinarily employed as dyeing auxiliaries.

They may be employed as wetting, penetrating, dispersing, deflocculating and as dye retarding agents. They are also used to maintain a bath in a clean condition free from insoluble matter and conglomerates, which vitiates colors and prevents the development of bright shades on the textiles being dyed.

Non-ionic surface active compounds though theoretically serviceable are not easily produced with predominant hydrophilic characteristics. Consequently, with a few noteworthy exceptions, the commercially available members of this class are not properly balanced to act as outstanding wetting and penetrating agents. These characteristics are more-

over more pronounced in warm solutions than in liquors maintained at the conventional elevated temperatures of dyeing. These compounds are well qualified for low temperature dyeing and some application has been made of the compounds for this purpose. The "non-ionics" as a class do not act as dye retarding agents and ordinarily do not produce as level and uniform shades as when anionic adjuvants are employed in the bath.

A few "non-ionics", however, act as excellent agents for pasteing up colors, particularly acetate. Some application of the class are finding use in the one bath method of simultaneously scouring and dyeing woolen yarns and fabrics, a process for which the anionic and cationic surface active compounds are unsuited.

The cationic surface active compounds are even less suited for service as dyeing auxiliaries than the "non-ionic". These adjuvants bear a positive electrical charge and react with many anionic dyestuffs forming insoluble compounds and colloidal conglomerates. These are irregularly deposited or smeared over the surface of textiles being dyed. This property of decreasing the solubility of colors, such as directs, finds some application in dye setting, and is of value in print washing and rendering dyed materials such as rayon linings fast to perspiration. Cationic auxiliaries are also absorbed from solution by textiles in much the same way as a dyestuff. Consequently the product of union between the adjuvant and color is attracted to the fabric being colored and deposited. Although accelerated dyeing occurs the colors do not penetrate and are usually surface deposits.

Attempts have been made to utilize the tendency of "cationics" to affix themselves onto fibers to produce color lakes and "resist" yarns. The results have not been particularly successful. Wool color can be applied to cellulosic fibers mordanted with "cationics", but the shade produced have been too light and transitory to be of economic importance. It is claimed that nylon yarns may be mordanted with certain types of cationic surface active compounds and subsequently dyed full shades with direct colors. Although such allegations are of doubtful validity at the present stage of the evolution of surface active compounds, there is no sound reason to believe that such mordanting may not eventually be successful.

The means by which anionic surface active compounds act as dye auxiliaries is still a controversial matter among scientists and it is probable that a number of factors contribute to their usefulness.

It is often assumed that the dye dispersing and deflocculating properties of the "anionics" constitute their chief function in dyeing. It is probable that these factors are a secondary importance particularly when used with direct colors. It has been rather conclusively proved that the ability of the auxiliary to wet out and penetrate yarns and fibers is a factor of much greater significance.

Many dyestuffs produce in solution colloidal particles. These are usually anionic and although they tend to repel anionic compounds are often coated in a thin sheathe of an anionic surface active compound. This orientation tends to accentuate their anionicity and hold them off from fabrics. As a result dyeing is retarded.

The dye dispersing and deflocculating properties of anionic surface active compounds, their wetting and penetrating ability and the tendency of such compounds to align themselves about dye colloids constitute factors of importance in inducing level color shades in dyeing.

An additional factor of importance in the dyeing operation is the maintenance of a clean bath. Fabrics often reach the dyebath containing a modicum of oil, grease, soap and other impurities (remnants from the scouring operation). These tend to vitiate a dyeing operation, especially in the presence of lime and magnesium salts, by agglomerating and collecting on fabrics as a scum or as spots. Excess color also frequently collects on materials during dyeing. The formation of such matter can be prevented by the presence of a suitable dye auxiliary in the dye bath.

FINISHING

Surface active compounds find application in most finishing operations. They are used as softening, dispersing, emulsifying and as precursors of some desired compound. Certain members also possess antiseptic and moth-proofing properties.

SOFTENING AGENTS

Two general types of softening agents exist, namely, those of an anionic and those of a cationic nature. Satisfactory agents are produced by securing a proper balance between a suitable hydrophobe usually an octa-decyl radical and a hydrophile with the effect of the former predominating.

The types of handle produced on textiles and the general characteristics of the two types of softening agents are radically different. This difference results from the nature of the electrical charge present on the hydrophile.

Most textiles are anionic and consequently attract cationic softening agents from solution. These may be affixed onto the fibers and exhausted from solution. The actual orientation is probably very different from that secured with an anionic softener. It has been pretty well established that the hydrophobe of an anionic softening agent encases yarn filaments with the hydrophiles protruding from the sheaths and away from the fabric. Just what configuration a "cationic" acquires is still a matter of speculation. It has been stated that the touch of a yarn softened with a cationic softening agent is due to an external hydrophobic sheath with the hydrophiles affixed within the fibers.

This difference in charge has assumed importance in methods of finishing. Cationic softening agents are exhausted from very dilute solutions in much the same way as dyestuffs. Consequently this class of softening agents are often applied in the last rinse bath after dyeing. The union between a cationic softening agents and a textile is often durable and it may even survive repeated launderings.

No such fixation is secured with anionic auxiliaries. The softener is usually applied from fairly oncentrated solutions and its effect is but transient. It is more or less completely removed from a fabric during the first washing.

The better types of cationic auxiliaries are much more effective softening agents than the anionic, producing effects that cannot be even approximated by the latter.

Many "cationics" tend to yellow whites, particularly bleached white and impair the fastness of certain colors to light. There are, however, many members of this family comparatively free from these adverse characteristics and nearly as free in inducing color changes on textiles as the "anionics".

The cationic auxiliaries are not good plasticizing agents and not suitable for use with many anionic sizes and auxiliaries. The cationic agent reacts with negatively charged bodies often producing insoluble scums and spots. Residual soaps and oils present on rayons occasionally form precipitates with the "cationics".

This characteristic has been utilized in producing dulling effects on rayon fabrics. This is secured by alternately exposing rayon materials to sulfated fatty alcohol and certain cationic surface active compound solutions.

Anionic softening agents usually constitute the plasticizing agents for textile finishes. They are compatible with most finishing agents and usually aid in inducing proper wetting and exhaustion.

DISPERSIONS

Dispersions are assuming increasing importance in textile finishing operations. Such dispersions are employed in the dulling of rayon fabrics and as a means of imparting desirable finishing effects. These effects are often permanent to laundering and dry cleaning.

Dispersions are usually prepared by suspending colloids or finely ground pigment particles in a solution containing a surface active compound. The latter tends to accumulate at the colloid-solution interface and orient itself about the finely ground particles, the hydrophobic portion of the suspending agent enveloping the colloid;—the hydrophile either attaching itself to free ionic groups within the particles or pointing away from the colloid and toward the water phase.

Two types of surface active dispersing agents exist—anionic and cationic. Non-ionic dispersants likewise exist but they have not yet received much industrial application in the textile industry. A good dispersing agent, like an emulsifying agent, requires in the molecule a hydrophobic-hydrophilic balance with the former predominating. The hydrophilic properties should be just sufficient to carry the attached hydrophobe.

Many particles and colloids used in textile finishing are ionic and in consequence tend to attract or repel surface active compounds depending upon whether the dispersant bears an unlike or like charge. Thus zinc oxide which is cationic is inclined to require a cationic dispersing agent to produce a homogeneous dispersion. Conversly silica or silicon dioxide, which is anionic, requires an agent of like charge.

Actually the type of dispersant is often of lesser importance than the hydrophobic-hydrophilic balance within the molecule of the dispersing agents.

The free electrical charge within the colloid may be neutralized or even reversed by a dispersing agent. Rubber colloids are ordinarily anionic. Such colloids can be dispersed by either cationic or anionic surface active compounds. In the preparation of such emulsions the latex particles acquire the ionic characteristic of the dispersing agent. Thus the rubber colloids in a latex produced with a quaternary ammonium compound are cationic and anionic when prepared with soaps.

Most textiles are anionic. As a consequence cationic pigments and colloids are "exhausted" from dispersions by textiles. Conversely, but little matter is removed from an anionic suspension.

This rule receives numerous applications in textile processing, though many factors are involved in its successful application. The development of modern dulling, resin, latex and even "waterproof" finishes are partially dependent on the ingenious adaptation of this law.

The past few years have witnessed the development of a number of heat unstable cationic surface active compounds. These are adsorbed from aqueous, and in some cases solvent solutions, by textile products and affixed on and within its substance by baking. The most publicized of such compounds are the waterproofing agents of the Velan and Zelan types. A number of new cationic types of water-repellent were developed by the Germans in the closing days of the war, but little is known of their properties and chemical compositions. These compounds are alleged to be superior to Velan and simple to apply, no baking of the treated fibers being required to produce results. One such compound is reputed to be a betaine, another an ethene amine condensate. Details regarding the nature of these repellents can be expected shortly.

It is interesting that chemists and scientists have to date confined their studies almost solely to the hydrophilic portion of surface active compounds. The anionic moiety of the compounds has been carefully studied and the available radicals for attachment to the hydrophobe has been apparently exhausted. It would appear that from that knowledge already in our possession no important changes in the post-war types of anionic auxiliaries can be expected. This can be materially altered when new hydrophobes are evolved.

The non-ionic types of surface active compounds are being rapidly expanded and agents of greater efficiency and versatility can be expected.

It is the cationic surface active compounds that will probably occupy the greatest attention of surface active chemists. These possess inherent properties from which should be synthesized dye mordants, durable textile finishes, durable water-proofing agents and possibly even durable fire retardants. Textiles may be expected to be rendered durably "proofed" against moth ravages and mildew infestations by "advanced cationic" finishes.

Your
RED CROSS
must carry on!

MEETING, SOUTHEASTERN SECTION

THE Southeastern Section will hold their first meeting of the year at the Ralston Hotel in Columbus, Georgia, April 20.

M. T. Barnhill will talk on "How Different Types of Dyestuffs Affect the Rate of Deterioration of Cloth Exposed to Weathering." Paul K. McKenney will speak on "You and Your Job." Both men are widely known in the textile industry in the Southeast. Mr. Barnhill is superintendent of dyeing at Avondale Mills in Sylacauga, Alabama. Mr. McKenney is president of Swift Manufacturing Company in Columbus, Georgia.

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STUDENT SECTION, NORTH CAROLINA STATE COLLEGE

IN January, the recently re-activated Student Chapter at North Carolina State College elected the following officers:

Chairman, Horace Penn; *Secretary*, Elizabeth Frazier; *Treasurer*, David Fuchs.

The purpose of this organization is to bring to the students the practical and workable ideas of industry. From this, with his theoretical background, he may devise other worth-while thoughts or ideas.

The student chapter has had some of the outstanding men of the textile industry as its speakers.

On March 1, Ben Verity, Technical Advisor, Carbic Color and Chemical Co. spoke on "Indigosol Dyes." He has had practical knowledge of dyeing processes at American Chemical Co. and Dominion Textile Co. Print Works, Canada. Samples of Indigosol dyed skeins and piece goods were shown.

On March 3, Charles B. Ordway, Technical Advisor, American Aniline Products, Inc., Charlotte, lectured on "Evaluation of Textile Auxiliaries" in the morning and on "Preparation and Processing of Synthetic and Blended Fabric" during the afternoon session. He has an excellent background for his work having had plant and technical experience in dyeing and finishing and taught at Auburn for several years.

On March 4, Adrian Stuart, a 1945 graduate of N. C. State College, employed by Dan River and Riverside Mills as Chemist discussed the set-up and operation of the dyeing and finishing machinery at Dan River.

The last lecture was given by Reid Tull, Salesman, Arnold Hoffman Co., Inc., Charlotte, a 1933 graduate of N. C. State College who explained the uses of wetting agents, synthetic detergents and water-proofing agents.

Respectfully submitted,
Elizabeth J. Frazier, Secretary.

EVALUATION OF FASTNESS TO ATMOSPHERIC FUMES OF DYED CELLULOSE ACETATE RAYON

New Tentative Method

SCOPE

THIS method of testing covers the testing procedure for determining the resistance to fading of dyed cellulose acetate rayon when exposed to atmospheric fumes.

TEST SPECIMENS

Each test specimen shall measure at least 2¼ x 4 inches. No test specimen shall be brought in direct contact with a hot metallic surface. If pressing is necessary to remove wrinkles, the specimens shall be ironed between two layers of closely woven cotton cloth or pressed out with a steam press.[1]

(A) For fastness to fume fading in general storage:
A specimen of the original fabric shall be used.

(B) For fastness to fume fading after dry cleaning:[2]
One specimen shall be immersed in cold Stoddard Solvent for ten minutes, squeezed, and allowed to dry in the air. One specimen shall be immersed in cold perchoroethylene for ten minutes, squeezed and allowed to dry in the air. If desired, either carbon tetrachloride or trichloroethylene may be substituted for perchloroethylene.

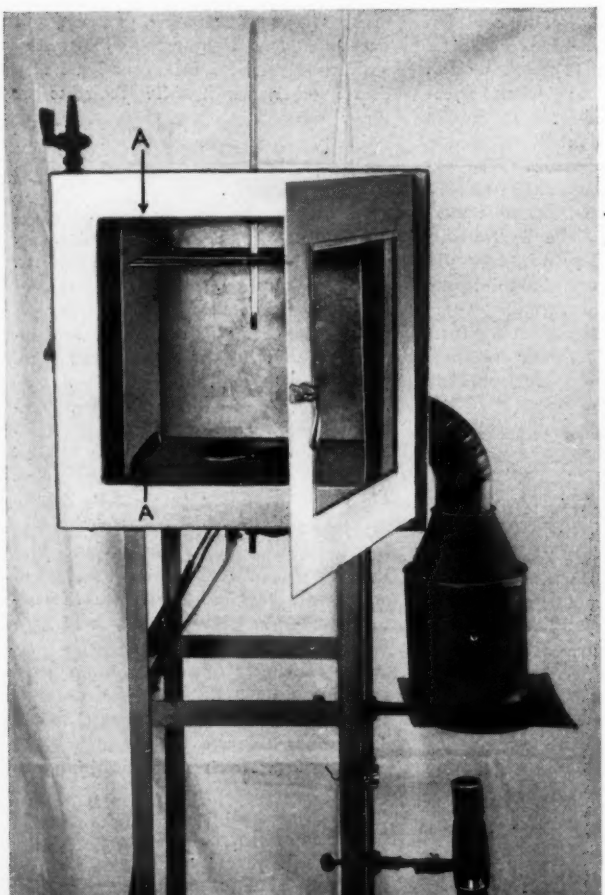
Note: A sample after dry cleaning and before fume testing shall be retained to compare with the tested sample.

(C) For fastness to fume fading after washing:[2]
Unless a specific wash test is specified, the test specimen shall be washed in a soap solution (containing 5 grams of eighty-eight (88) per cent, neutral soda soap per liter of water of approximately zero hardness) for ten minutes at 100° F., rinsed in warm water and allowed to dry in the air.

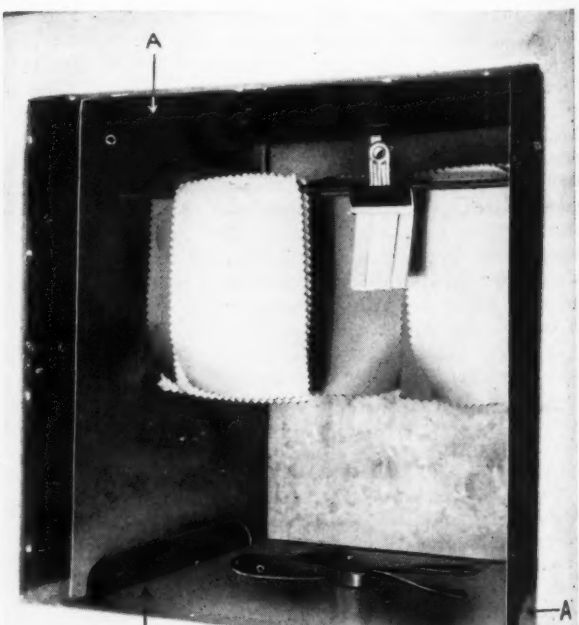
Note: A sample after washing and before fume testing shall be retained to compare with the tested sample.

APPARATUS

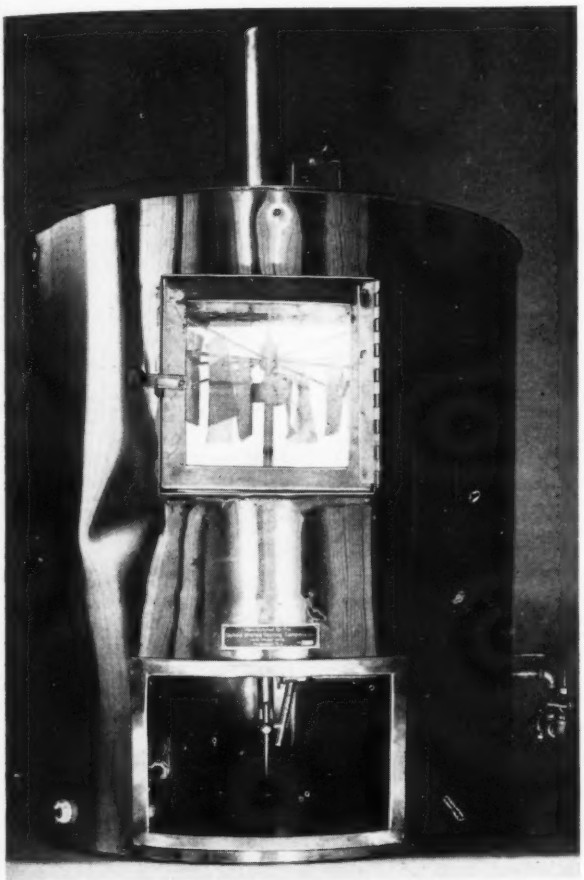
Any equipment in which the test samples can be exposed to air which has passed through the flame of a lighted gas burner will serve satisfactorily. Equipment of this type has been used for several years by the various testing labora-

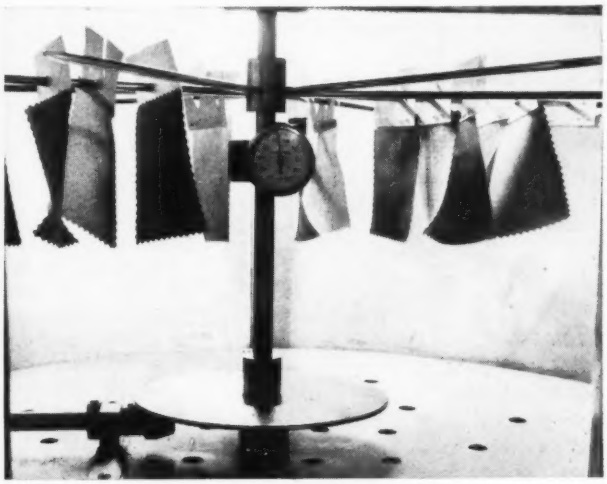


←*Figure 1*



↓ *Figure 2*

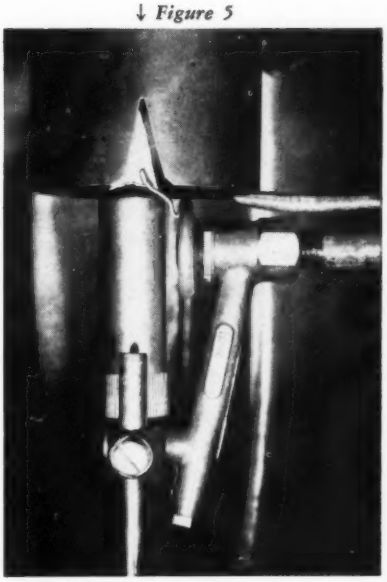




← *Figure 3*

↑ *Figure 4*

↓ *Figure 5*



tories.[2] A typical installation for small-scale testing is shown in Figure 1 and 2. The gas chamber is made of galvanized iron with a glass window in the door, and a thermometer inserted through a hole in the ceiling. The gases, from a lighted Meker burner (Figure 1) enter the chamber at the right side, are deflected by baffle plates AA and are kept in circulation by means of a fan driven by a small electric motor. In Figure 2 the samples to be tested are shown suspended from metal rods.

The United States Testing Company, Hoboken, New Jersey, in cooperation with the American Association of Textile Chemists and Colorists have developed a new type of gas-fading apparatus (See Figure 3) which is suitable for large-scale testing. The unit collects the fumes from a safety-type Electrolux burner which is located in a lower chamber, as shown in Figure 5. In order to assure uniform fading of the test specimens, which are suspended as in Figure 4, the arms on which the samples are hung are revolved at the rate of two turns per minute by a motor drive, thus insuring that all samples are exposed under identical controlled conditions. Since this test apparatus has been primarily designed for more accurate control work, it is recommended that the temperature should be so adjusted as to complete one test in 7-16 hours.

PROCEDURE

Samples of the specimens each measuring approximately 2¼ x 4 inches shall be suspended freely in the chamber together with the "Control Sample No. 1". The gas[4] burner shall be lighted, and the flame adjusted so that the temperature in th chamber does not exceed 140° F.[5] The samples shall remain in the chamber until the "Control Sample No. 1"[6] shows a change of shade corresponding with that of the "Standard of Fading", when compared in daylight ranging from average daylight to slightly bluish north sky light or equivalent artificial light. Any samples which show no fading shall be suspended again in the chamber along with a fresh control sample and the test shall be continued until the control sample shows a change of shade corresponding with that of the "Standard of Fading."

This procedure shall be repeated as often as is necessary or desired, to disclose the number of exposure periods necessary to produce an appreciable alteration of shade. After each exposure period the samples shall be removed from the chamber and immediately compared with the respective unexposed portions of the specimens.

CLASSIFICATION

A sample which, when subjected to one exposure period shows an appreciable alteration in shade, shall be considered to have "0" degree fastness to atmospheric gases. Samples which, when subjected to more than one exposure period show an appreciable alteration of shade, shall be considered to have a number of degrees

of fastness to atmospheric fading equal to one less than the number of exposure periods to which they have been subjected.

Note: Appreciable alteration in shade shall be understood to mean a change which is immediately noticeable in comparing the tested specimen with a corresponding sample of the original. In making the comparison, the specimens shall be viewed by looking squarely at the surfaces rather than at an angle.

REPORTING

Samples which are rated as "one degree of fastness" shall be considered to have good resistance to atmospheric fading. Samples which are rated as "two degrees of fastness" shall be considered to have very good resistance to atmospheric fading. Samples which are rated as "three or more degrees of fastness" shall be considered of superior resistance to atmospheric fading.

EXPLANATORY NOTES

1. *Heat by Iron*

When an acetate fabric has been ironed with an iron which is hot enough to remove all wrinkles, there is danger of sealing the surface of the fabric which would increase the resistance to gas fading. This technique is not conducive to accurate test results.

2. *Dry Cleaning and Washing Test Specimens*

All the inhibitors available at present are soluble to some extent in water and therefore tend to be removed by washing. These inhibitors are in general not soluble in the ordinary dry cleaning solvents, and fabrics treated with suitable inhibitors should withstand several dry cleanings without losing their resistance to gas fading (if the dry cleaning operation does not include spotting or sponging with water.) The inhibitors tend to lose their efficiency if the fabrics come into frequent contact with perspiration.

3. *Apparatus*

Several forms of suitable apparatus are illustrated in the AMERICAN DYESTUFF REPORTER, July 22, 1940, pages 368 and 369. A complete exposure chamber of the type illustrated in Figures 1 and 2 can be purchased from the Continental Tin and Sheer Metal Works, 145 West 24th Street, New York. Blueprints of scale drawings of the apparatus shown in these photographs may be purchased for $1.00 from Dr. Louis A. Olney, Lowell Textile Institute, Lowell, Massachusetts.

4. *Gas*

Illuminating gas furnished by the gas companies in Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania and Delaware has been used in this work, including both natural and manufactured gas. The results were essentially the same in all cases. Any gas burner may be employed, and either a luminous (yellow) or a blue-green flame is suitable, though the latter is to be preferred in order to avoid formation of soot. A wire screen placed above the flame at a distance which causes it to be heated somewhere between a red and a white heat will increase the percentage of oxides of nitrogen (the color-destroying gases) produced by the burning gas, and will thereby accelerate the fading of the samples. Brass, iron, monel metal and stainless steel screens give practically the same results.

5. *Temperature for Testing*

Other things being equal, the rate of fading of the samples will vary according to the temperature in the exposure chamber, which in turn depends on the amount of gas consumed in a given period. Exposure for 8 hours to 12 hours at 140° F. may cause as much color destruction as exposure for 96 hours at 70°-80° F. Aside from this, the temperature may vary somewhat in different parts of the exposure chamber from time to time. It is also recommended that a motor-driven fan be installed in the exposure chamber to keep the fumes well distributed, or better still, that the sample holder be rotated in the exposure chamber.

6. *"Control Sample No. 1"*

Pieces of "control sample No. 1", dyed with 1.0% Celanthrene Brilliant Blue FFS, were hung up in the air in three separate places in South Jersey for six months. It was assumed that the air in these places contained an average content of oxides of nitrogen. At the end of the exposure period the three samples were assembled and compared with the original shade. All had changed about equally, being decidedly duller and redder than the original. This faded shade was next matched accurately with vat dyes on cellulose acetate satin. This constitutes the "Standard of Fading", which is permanent (by contrast with the pieces of "control sample No. 1", which would continue to change shade if left exposed to the air), and serves as a measuring stick to indicate when "control sample No. 1" in the exposure chamber has had a gas treatment equivalent to six months of actual exposure to average air.

Caution: "Control sample No. 1", being sensitive to atmospheric gases, should be kept in a closed container and protected from strong light when not in use.

A sealed unit of "control No. 1" comprising 20 yards of ribbon 2¼ inches wide, along with a sample of the "standard of fading" may be obtained for $2.00 from H. C. Chapin, Sec., A.A.T.C.C., Lowell Textile Institute, Lowell, Massachusetts.

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MEMBERSHIP APPLICATIONS

SENIOR

Leonard J. Armstrong—Research Chemist, Rohm & Haas Co., Philadelphia, Pa. Sponsors: S. N. Glarum, H. B. Walker.

John W. Arnall, Jr.—Gen. Foreman, Marshall Field & Co., Spray, N. C. Sponsors: J. D. Sandridge, W. B. Carroll, Jr.

William F. Barnes—Assist. Dyer, Wayne Knitting Mills, Fort Wayne, Ind. Sponsors: G. J. Dolan, A. F. Blackburn.

Charles G. Benson—Boss Dyer, Slater Dye Works, Pawtucket, R. I. Sponsors: T. F. Daley, T. H. Bryant.

Lester H. Bingham—Dyer, John T. Slack Corp., Springfield, Vt. Sponsors: J. T. Allen, H. M. Hartnett.

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Joseph H. Brant—Director of Fundamental Research, Institute of Textile Technology, Charlottesville, Va. Sponsors: J. F. Smith, H. C. Chapin.

Albert Bruno — Salesman, General Dyestuff Corp., New York, N. Y. Sponsors: J. H. Hennessey, H. E. Hager.

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William C. De Witt — Overseer, Union Bleachery, Greenville, N. C. Sponsors: C. N. Rabold, L. W. England.

Fred W. Duggan—Plastics Development Engr., National Carbon Co., Bennington, Vt. Sponsors: D. J. Eccleston, A. F. McLean.

Joseph R. Ellis—Chemist & Colorist, General Dyestuff Corp., Charlotte, N. C. Sponsors: K. A. Bridges, S. H. Williams.

Louis Erera—Assist. Supt., Allied Kid Co., Wilmington, Del. Sponsors: E. J. Smith, L. W. Hansen.

(Concluded on Page P178)

THE EFFECT OF CHLORINE RETENTION ON RAYON FABRICS*

WALTER STUMP

Crown Tested Dept., American Viscose Corp.

IN speaking to you tonight, I feel like the fellow who was asked when he left the church after the wedding ceremony, how he liked married life and what advice he could give to his fellowman. I am still on a blissful honeymoon with this new gadget that tells us what chlorine does to fabrics, particularly rayons. The man who really should be up here talking to you is Dr. Epelberg of Cluett, Peabody. He has far more experience with this machine than I, since it was developed in the laboratory of Cluett, Peabody & Company, who with their customary thoroughness in getting to the bottom of things wanted to find out in what way cellulose was affected by acids and alkalies and for lack of instruments to tell them this, developed their own. When they found that it was also suitable for determining the effect chlorine has on rayon they were kind enough to show us this machine and let us have the blueprint of it. We turned this blueprint over to Alfred Suter, who as you know, builds many different testing machines and he constructed two of these new testing instruments for us, one to run on A-C current and one to run on D-C. In the future, the instrument will be built so as to run on either A-C or D-C current.

At this point, I would like to review briefly the reason for our interest in testing the effects of chlorine on rayon. As many of you know from experience when rayon shirts came on the market a few years ago, they were at first found rather unsatisfactory because of shrinkage which ran as high as 10 and 12 per cent. This led to customer complaints in stores in spite of the increasing shortage of shirts and when shirt manufacturers began to look for fabrics with lower shrinkages, we, ourselves, in the "Crown" Tested Department of the American Viscose Corporation found it necessary to change our requirement for Green Light fabrics to a maximum residual shrinkage of 3 per cent and in the case of fitted shirts to 1 per cent. In order to obtain these low shrinkages the fabrics had to be treated with either urea formaldehyde or melamine formaldehyde resins for stabilization since no other stabilizers were then available. Now the trouble started. When white shirts made from such fabrics were sent to the laundry, or even when they were laundered at home in soap liquors containing javelle water or other types of chlorine bleaches, some of the chlorine was retained by the resin. in all cases where too much chlorine was used, where the rinsing was not efficient and where no antichlor was given. We found that, unfortunately, not all laundries were willing to use antichlor. White shirts which held a residue of chlorine turned yellow when they were pressed with a high degree of heat and after a few more launderings under the same conditions they simply disintegrated. It would have been easy to avoid this if rayon shirts could have been washed by the usual silk or rayon formula which does not call for chlorine in the wash liquor but rayon shirts cannot be identified easily enough when the wash is sorted out and we readily admit that we cannot consider this the fault of the laundry. We defy any one of you experts to go into a laundry and sort a mountain of shirts that are dirty and crumpled and to tell us which one is cotton and which is rayon. We hope, however, to achieve this soon with the right kind of labelling.

I want to point out also that resins are not the only chlorine retentive finishing materials. Some of the cation-active softeners, most of which are permanent, have a tendency to retain chlorine.

We have definite proof that if a rayon shirt is starched, the starch will retain chlorine in the subsequent laundering

Walter Stump of American Viscose Corporation's "Crown" Tested Department, examines a strip of fabric just removed from the testing machine, to determine the extent of chlorine damage.

* Presented at Meeting, New York Section, February 15, 1946.

wherever it is not completely eliminated. Weak spots develop in the shirt and cause holes which puzzle the owner of the shirt as well as the laundry and usually lead to a complaint that there was a fault in the fabric.

When we found it necessary to keep a watchful eye on chlorine retention of rayon fabrics we looked around to find the best possible method. We found that the potassium iodide starch test either with the solution or with test papers was he most commonly used method but we soon found that it is not very satisfactory since it merely indicates the presence of chlorine in a fabric but does not give any indication as to the amount of chlorine and the damaging effect it may have on the fiber. Then on one of our visits to the Cluett, Peabody laboratory we were introduced to this instrument by Dr. Epelberg who demonstrated it to us. We were immediately convinced that it was the right medium for determining the effects of chlorine on rayon fabrics.

The test is actually a very simple one but like all tests made with scientific precision it takes longer than one in which you merely drop a solution on a piece of fabric or hold a test paper to it.

The procedure is as follows: We take one liter of water which is heated to 140° F. and add to it 25 cc. of a solution containing 5 per cent available chlorine. Into this we immerse the fabric which is to be tested as well as a control sample which we know to be non-chlorine retentive. We leave the fabric immersed for 10 minutes maintaining the temperature at 140° F. After 10 minutes we remove the samples and rinse them well in warm water. We now continue to rinse in fresh water until the water as well as the control sample show no signs of chlorine when tested with starch iodide indicator. This means that either all the chlorine has been rinsed out of the fabric or that it remains insoluble in the fabric.

The rinsed sample is squeezed in a towel or whizzed in order to remove the excess water, and is ironed until dry. We then prepare strips in order to make tensile strength tests by the raveled strip method. We place these strips for 30 seconds into the slot on top of the instrument and place a metal block on it so that it is pressed down between two hot metal platens. These have previously been heated to 400° F. and this temperature is automatically maintained.

Chlorine damage is shown immediately by the degree of scorch present on the fabric after the 30-second heating period. This scorch ranges all the way from a faint yellow to a deep brown.

The strips are then broken on the tensile strength tester and since we know the original strength of the fabric we can now determine the exact percentage of loss of tensile strength.

This test using 25 cc. of the 5 per cent chlorine solution is an accelerated test. If we want to duplicate the laundry procedure we would use 2 cc. of the 5 per cent chlorine solution which would duplicate an actual wash formula containing 0.01 per cent or 100 p.p.m. available chlorine. I must point out, however, that while this laundry formula is one recommended by the National Laundering Association it is, unfortunately, not strictly adhered to by all laundries. We have found that many of them operate much in the fashion of the old style dyer and finisher who when he prepared his dye liquor or finish bath would take a bowl of this or that and just throw it in for good measure. We have found only a few of the highest type laundries to use any kind of control over the amounts of chlorine which they are using.

This, briefly, is the test procedure which American Viscose Corporation is currently using to determine chlorine retention and its effects on rayon fabrics. As I said in the beginning we are still in the honeymoon stage with this fascinating gadget but we hope that very soon we will have more data available than I was able to give you tonight and any of you who are interested will always be welcome at our offices or laboratory whenever you want to obtain such additional data, or to see the machine in actual operation.

—♦ ♦—

MEMBERSHIP APPLICATIONS

(Concluded from Page P176)

Agustin A. Etcheverry—Textile Colorist, Industrias Quimicas Uruguayas "Duperial", Montevideo, Uruguay. Sponsors: C. A. Sylvester, C. A. Seibert.

Frederick K. Fairburst — Dyer, Ankokas Mills, Mt. Holly, N. J. Sponsors: E. H. Keys, J. P. Conaway.

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Dan H. Henderson—Assist. Dyer, Riverside & Dan River Cotton Mills, Inc., Danville, Va. Sponsors: I. S. Hurd, D. E. York.

CALENDAR OF COMING EVENTS

NORTHERN NEW ENGLAND SECTION:
Meeting: May 17.
Outing: June 7

RHODE ISLAND SECTION:
Meeting: April 26.
(Providence Engineering Society Hall, 191 Angell Street, Providence, R. I.)

PHILADELPHIA SECTION:
Meetings: April 12, May 24.

NEW YORK SECTION:
Meeting: May 3.
(Downtown Athletic Club, 19 West St. New York City.)

MID-WEST SECTION:
Meeting: May 4.
(Schroeder Hotel, Milwaukee, Wis.)
Outing: June 22
(Lake Lawn, Delavan, Wis.)

SOUTH CENTRAL SECTION:
Meeting: April 13

SOUTHEASTERN SECTION
Meeting: April 20.
(Ralston Hotel, Columbus, Ga.)

NATIONAL CONVENTION:
Silver Jubilee Convention: December 12, 13 and 14.
(Hotel Statler, Boston, Mass.)

ABSTRACTS FROM CONTEMPORARY JOURNALS

ZEIN FIBERS—PREPARATION BY WET SPINNING

C. B. Croston, C. D. Evans, and A. K. Smith, Industrial and Engineering Chemistry, page 1194, Vol. 37, No. 12, December, 1945.

This investigation was directed toward the development of a practical process for making zein fibers by a wet spinning method and toward evaluation of the fibers.

High viscosity zein solutions of 13 to 16.5 per cent concentration are required for spinning fibers. An aqueous alkaline dispersion was developed. Dispersions of high viscosity were prepared by using "(a) an initially high zein concentration, (b) a dispersion of low concentration and low viscosity with aging, and (c) denaturing or gelling agents, such as urea or alcohol, or surface denaturation induced by air bubbles which were stirred into the dispersion." Formulas are given for the preparation of satisfactory spinning dispersions. The most frequently used dispersion was prepared with the following (per cent by weight): 13.0 per cent commercial zein, 68 per cent water, 17.0 per cent 0.4 N NaOH, 0.5 percent formaldehyde urea 1.5 per cent, aging time 72 hours.

Photographs are shown of the apparatus used for spinning the fibers and the equipment for continuous stretching and drying of the fibers. The equipment differs from that used for spinning viscose rayon only in details of construction and arrangement. The process for spinning is described as follows: "The zein dispersions were forced by air pressure, which could be controlled within a range of 0-200 pounds per square inch, through the metering pump, candle filter, and spinnerette, and into the acid coagulating bath. The spinnerettes were 1.5 inches in diameter and contained 100 to 3000 holes, with hole diameters in the range 0.003 to 0.006 inch. The coagulating bath composition most frequently used consisted by weight of 4.7 per cent sulfuric acid, 3.1 per cent acetic acid, and 4.4 per cent zinc sulfate. The salt was not always necessary, and with many formulations either of the acids, in the proper concentration, gave satisfactory results. When the spinning formulations resulted in tacky fibers, the salt of the coagulating bath hardened the surface of the fibers and prevented them from plastering."

After coagulation and gathering the fibers into a tow they are given a mild formaldehyde treatment before stretching. This treatment has been designated "precure". This was found to be necessary before the fibers could be effectively stretched. The extent of the precure greatly influenced the character of the fibers. Stretching was done in a tank of water between two large reels driven at variable speeds. The tow was dried in a variable-velocity air stream maintained at about 65°C. The fiber was pulled from the dryer by an aluminum wind-up bobbin. The results of variations in the precure treatment are given.

Fibers have been produced which are high in dry and wet strengths, have high resilience and are very flexible; fibers finer than 0.6 denier have been produced. Preliminary studies on dyeing have shown that, after postcuring with strong formaldehyde, the fiber does not stand the severe acid conditions normally used in dyeing and processing wool. The dyeing properties, in general, are improved by acetylation.

DYESTUFF NOMENCLATURE

C. L. Bird, Journal of the Society of Dyers and Colourists, page 321, Vol. 61, No. 12, December, 1945.

A list of dyestuff manufacturers (British, French and Swiss) is given, followed by a tabulation of the commercial names used by these manufacturers which gives the class and use of each and also the chemical constitution.

Explanatory remarks indicate that, in the simplest case, the commercial name of a dye will divide into three parts: (1) defining the dyeing class, (2) color of the dyeing, and (3) strength of the dye. The following example is given:

(1)	(2)	(3)
Naphthalene	/ Orange G /	125

This is interpreted as follows: (1) indicates it is an acid wool dye, most probably of an azo structure; (2) defines the color imparted to wool; (3) indicates it is stronger than the standard (taken as 100). Letters following the color name are used as follows: B-bluish, G-yellowish and R-reddish.

A more complex case is illustrated by the following:

(1)	(2)	(3)	(4)	(5)
Caledon	/ Paper /	Gold Orange G	/ S /	Powder Fine

This is interpreted as follows: (1) indicates that this is a member of a vat series of recognized high fastness to light and washing and that it is an anthraquinoid compound; (2) shows that it is standardized for the paper industry; (3) indicates the color; (4) indicates standard strength; (5) indicates physical condition.

There is also an alphabetical summary which gives the significance of brand letters which may be appended to the commercial names of dyestuffs.

THE COLOURING OF PLASTICS

C. R. M. Oeblcke, Journal of the Society of Dyers and Colourists, page 306, Vol. 61, No. 12, December, 1945.

There are four ways in which plastics can be colored: (1) dyeing on the surface, (2) lacquering on the surface, (3) using soluble dyestuffs (water- or solvent-soluble), and (4) using organic or inorganic pigments. Methods 3 and 4 are the principle ones for coloring plastics. The more modern plastics are best colored with insoluble lakes or pigments. Most lakes of acid dyes possess good solvent fastness but poor light fastness, hence pigment dyestuffs are more in demand. Yellow, orange, scarlet, red, blue and green shades are fairly satisfactory but not many possess the highest fastness in pale tints. Violet and reddish blue shades are less satisfactory. Brown shades are difficult and best results are obtained with mixtures. Mixtures of pigments for browns usually change tone with concentration, but this can be corrected by blending acid dyes, pigments, etc. during manufacture.

Water-soluble acid, basic and direct dyes can be used for coloring casein plastics. Pigments can be used but are not necessary except where high lightfastness is demanded. Dyestuffs must be of good solubility and fast to heat and formaldehyde. A list of suitable acid and direct dyes is given.

Phenol-formaldehyde resins are usually furnished by the manufacture in a colored state. The color (soluble or pigment) is blended with the ground resin. A list of suitable acid and basic dyes, inorganic and organic pigments is given.

Cast resins of the phenol-formaldehyde type may be colored by many dyestuffs of all types providing the fastness to light is satisfactory. Best fastness is generally obtained with dyestuffs of the anthraquinone and pigment types. A list of suitable dyestuffs is given.

Urea resins make high demands on the fastness to light of colors. Pigment colors are mostly used, a listing of suitable ones being given.

Cellulose acetate and cellulose nitrate plastic materials may be colored with solvent soluble solors and pigments. Heat fastness is the chief processing requirement. The types of coloring materials which are suitable are indicated.

Pigment colors which are used for rubber are, in general, best for polyvinyl chloride plastics. Suitable pigments are indicated.

Pigments soluble in hydrocarbons can be used for coloring polystyrene. Emulsions are best colored with pigments in dispersed form.

Pigment colors should be preferably used in coloring polymethacrylate and polyethylene plastics.

A fairly complete discussion of fastness requirements of coloring materials for plastics is given.

THE DYEING OF COTTON WITH MINERAL KHAKI

Part VII—The Fungicidal and Bacterial Efficiencies of Cotton Yarns Treated by Various Mineral Khaki Processes

E. Race, F. M. Rowe and J. B. Speakman, Journal of the Society of Dyers and Colourists, page 310, Vol. 61, No. 12, December, 1945.

This is a report of a comprehensive investigation of the fungicidal and bacterial efficiencies of yarns processed with various chrome-iron pigments. Other conditions equal, there are three factors which might influence the moldproofing efficiency: (1) total chromium and iron contents of the yarn, (2) alkali-soluble chromium content of the yarn, and (3) the state of the chromium (whether hexavalent or trivalent) deposited on the yarn. Yarns were treated with seven types of chromium-iron pigments, developed either with potassium chromate or with alkali, in which each factor was varied in turn.

Methods of test used were as follows:

(1) a deep burial test in which the samples of yarn were buried vertically in a moist horse dung-soil mixture at 30°C.

(2) a shallow burial test in which the samples of yarn were buried horizontally between two ¼ inch layers of moist horse dung, prepared free from undigested or partially digested vegetable matter, in Petri dishes stored in a thermostatically-controlled incubator at 30°C.

(3) a test in which the samples of yarn were placed on the surface of horse dung prepared as in (2), in Petri dishes stored at 30°C.

(4) a test in which yarn, inoculated with horse dung, was incubated with free access of air.
a. on Berkefeld Filter Candles, and
b. in glass jars.

(5) tests carried out with free access of air, using as inoculum a pure culture of *Metarrhizium anisoplia.*

The above tests proved that hexavalent chromium is the only toxic principle. Trivalent chromium and iron compounds impart a resistance, but not a toxicity, towards bacteria and fungi. Hexavalent chromium is produced only by the chromate development process and is not permanent but is hydrolyzed by water and reduced by the cellulose of the material and possibly by reducing products of metabolism. Hence even the toxicity of hexavalent chromium is not permanent. The tests carried out also showed that alkali-soluble trivalent chromium plays no part in rotproofing cotton.

It was confirmed that the moisture content of material, under test in an inoculum containing a mixed culture of bacteria and fungi, plays an important role in determining the type of attack. Hence in carrying out comparative tests in which a mixed culture is used the moisture contents of all samples should be maintained at the same value.

Waterproofing yarn with wax imparts an added, though transient, resistance providing the wax does not serve as an additional source of nutrition.

In discussing the methods which have been employed to determine the fungicidal and bactericidal efficiencies of the various mineral khaki processes it is pointed out that the tests provide a comparison of the relative effectiveness of the various methods. Summarizing, the author states: "Thus, the normal method of carrying out the burial test, viz. by burying samples vertically in a comparatively large amount of soil or of a soil-horse dung mixture, does not appear to be of sufficient accuracy for any quantitative comparison of yarns, the fungicidal and bactericidal efficiencies of which are not widely different, and is liable, particularly in the early stages of degradation, to give conflicting and non-reproducible results. A more accurate test is one in which the samples are laid horizontally between layers of prepared horse dung in Petri dishes at a constant temperature. In any complete burial test in which the yarn is maintained with a moisture content >25 per cent approx., although it is likely that degradation is caused by aerobic microorganisms, degradation is confined almost wholly to bacterial attack, the action of cellulose-decomposing fungi being largely inhibited. When partial access of air is allowed by placing the samples of yarn under test on the surface of the inoculum, unequal rates of degradation occur in the same sample, deterioration being greatest on the surface exposed to the air. If complete access of air is allowed and horse dung is used as inoculum, attack by a variety of bacteria and fungi results, although it must be borne in mind that there is the possibility of chemical reaction between the constituents of the inoculum and the pigment on the yarn; e.g. in the case of a yarn, the pigment on which contains hexavalent chromium, the latter is reduced during the test by reducing matter in the horse dung at a greater rate than would occur under service or storage conditions.

"It is difficult to adapt as a quantitative method of evaluating fungicidal efficiency the method which uses a laboratory culture of mixed fungi, since the genus of fungi which flourishes on the material is either fortuitous or is dependent upon the nature of the proofing agent applied to the cotton. Further, when a pure culture technique which denies the culture all external nutrition is applied, it is impossible to carry out comparative evaluations of the various chrome-iron processes because, in every case, fungal growth is exceedingly slight and degradation of the cellulose negligible. In attempting a comparison of the fungicidal efficiencies of mouldproofs which do not differ widely in their efficacy, therefore, it is necessary (a) to employ as inoculum a single organism, and (b) to provide a slight amount of nutrient medium."

It is further pointed out that the technique applied to any particular material should be carefully chosen and should take into account the end use of the material. It is still further pointed out that laboratory accelerated mildew tests do not take into consideration the resistance of the proofing agent to leaching, photochemical action and other weathering agencies which might affect the agent or the material and the final test in evaluation is the performance of the material in use.

THE LEPIDOMETER — AN INSTRUMENT FOR MEASURING THE SCALINESS OF ANIMAL FIBRE

J. B. Speakman, N. H. Chamberlain and J. Menkart, J. Textile Inst., 1945, 36, T91-106; from the Journal of the Society of Dyers and Colourists.

The design and construction of an instrument for measuring the creeping power of individual fibers under a rubbing action in order to assess their scaliness are described. The fiber, with its root end downwards, is placed between two rubber or polythene surfaces which are caused to reciprocate under standard pressure. Fiber travel proceeds until the tension developed in a measuring device, to which the tip end of the fiber is attached, is sufficient to arrest motion, and the maximum tension developed is taken as a measure of scaliness. Measurements can be carried out in air or in aqueous solutions. It is shown that the scaliness of wool fibers increases with decrease of pH below 4, whilst above pH 9 it first increases and then, above pH11, decreases. Wet chorination decreases the scaliness of wool fibers whether rubbed in air or water, and decreased scaliness is undoubtedly the cause of unshrinkability in chlorinated wool. Wool is rendered unshrinkable by treatment with mercuric acetate and benzoquinone, but without decreasing the scaliness. Hence the decreassed shrinkage must be due to the modification of the elastic properties of the fibers which occurs on treatment with these reagents.

FRICTIONAL PROPERTIES OF WOOL FIBRES

M. Lipson, Nature, 1945, 156, 268-269; from the Journal of the Society of Dyers and Colourists.

The frictional properties of single wool fibers have been investigated by determining the minimum load required to cause the fiber to slide with the scales and against the scales when suspended over a cylindrical rod of polished rhinoceros hide, the contact surface being moistened with a solution containing 0.2 per cent soap and 0.1 per cent soda ash. The results show that a pronounced directional frictional effect exists and that this is markedly reduced in fibers treated with sulfuryl chloride and aqueous bromide. Treatment with alcoholic potash, however, cause no major reduction in the directional friction, suggesting that this reagent probably produces its unshrinkable effect in different manner.

UNSHRINKABLE WOOL

W. J. P. Neish and J. B. Speakman, Nature, 1945, 156, 176; from the Journal of the Society of Dyers and Colourists.

When wool is immersed in a solution of silicon tetrachloride in carbon tetrachloride, a vigorous reaction takes place between the adsorbed water of the wool and the silicon tetrachloride, a siliceous deposit being formed on the surface of the fibers and a high degree of unshrinkability being thereby obtained. Thus, the area shrinkage in milling of wool flannel was reduced from 28.9 per cent to 6.2 per cent by treatment in 5 per cent (by vol.) silicon tetrachloride solution at 25°C. for 5 min. Hence inorganic polymers produce similar results to those obtained by synthesizing organic polymers on the surface of the fibers.

THE FUTURE OF FINISHING

R. J. Smith, Journal of the Society of Dyers and Colourists, page 269, Vol. 61, No. 11, November, 1945.

One of the major considerations in the future of finishing is plant equipment. A baking plant capable of operating continuously over long periods at 150°-160° C. is becoming a standard piece of equipment which every progressive firm should possess. Greater use will be found for a decatizing machine. Tensionless jigs, and winches which reduce drag to a minimum, will become increasingly used. The use of stainless steel, light metal alloys, and plastics will be increased. Higher mechanical standards and uniformity of application will be increasingly important. A higher standard of labor and supervision must be attained through education. Further cooperation between the cloth designer and producer, the spinner, manufacturer and finisher are necessary to the fullest progress.

The majority of the post-war developments in the durable finishing field will probably come in exploring synthetic resins and cellulose ethers. A few examples illustrative of the versatility and wide range of effects producible by the use of synthetic resins is given.

The discussion which followed this paper, which was presented before the Scottish Section of the Society of Dyers and Colourists, is of unusual interest inasmuch as much of it is concerned with comparisons between Great Britain and the United States. It was pointed out that the U. S. had gained a two year lead between the start of the war for England and our entrance but that it was felt that Britain was not as far behind as one might suppose. Their difficulty lay, not in lack of knowledge, but in lack of supplies. It appeared that Britain was far behind the U. S. in regard to machinery.

THE FRICTIONAL PROPERTIES OF WOOL FIBRES IN RELATION TO FELTING

L. Bohm, Journal of the Society of Dyers and Colourists, page 278, Vol. 61, No. 11, November, 1945.

The phenomenon of felting has been studied in relation to the frictional properties of wool and a new experimental method of measuring the Directional or Differential Frictional Effect (D.F.E.) of wool fibers is described. Briefly, the experimental method was to "mount the oriented fibers on a glass slide in the form of a small bridge which was placed upside down on a horizontal glass plate immersed in the liquid. The slide was then connected by a thread to a container, and the measurements consisted of loading the latter by means of a fine water jet from a burette until the slide had just moved. The burette reading gave the value of the load, and, since the weight of the slide was known, the coefficient of friction was calculated from the expression—

$$\text{Coefficient of Friction} = \frac{\text{Load required to cause sliding}}{\text{Weight of the slide}}$$

The arithmetical difference between the maximum and minimum coefficient gives a numerical expression of the particular fibers in a given medium."

The present experimental results indicate that the degree of felting power is principally determined by the magnitude of the D.F.E. Summarized, these results show: (1) The D.F.E. values (in alkali) of a range of wools possessing widely different felting properties have been found to correspond strictly to their recognized felting powers. (2) The dependence of the degree of felting power on the pH of the milling liquor has been established to be due to the latter's influence on the magnitude of the D.F.E. (3) In non-aqueous media the D.F.E. of wool is very low compared with the D.F.E. in aqueous media. (4) Apparently, all anti-felting agents cause diminution in the D.F.E., although it is possible that the ability of some of these reagents to increase the resistance to deformation of the fibers contributes to their efficiency by rendering fiber entanglement more difficult.

It is concluded that felting power is primarily a function of the magnitude of the D.F.E., and therefore of the rate of fiber-travel.

THE DETERMINATION OF MILLING AND FELTING SHRINKAGE ON SMALL SAMPLES OF FABRICS AND LOOSE FIBRE

N. H. Chamberlain and J. Menkart, Jaurnal of the Society of Dyers and Colourists, page 286, Vol. 61, No. 11, November, 1945.

This paper surveys the accuracy and reproducibility attained hitherto in the measurement of milling shrinkage on small samples and describes a new type of felting machine applicable both to fabrics and loose wool. Simply described the machine consists essentially of a shallow, square box of stainless steel, of which the top and bottom are formed of fixed plates. The sides, attached at right angles to the ends of sliding rods, are capable of moving in and out in a direction at right angles to their length, the rods moving through fixed guide brushes located at the edges of the box. Two opposite sides of the box are moved in until they meet in the center, then withdrawn to their original position. The other pair of sides then move in a similar fashion. The cycle is continuously repeated. The box is approximately 6 inches square and ¾ of an inch deep.

The usual procedure for fabric samples was as follows:

"The pattern was first weighed, then soaked in the milling solution (for 5 min. in 10% sodium oleate solution in the case of soap-milled samples; overnight in sodium acetate-hydrochloric acid buffer solution at pH 1.05, using a liquor-fabric ration of 40:1, for acid milling), squeezed by hand and its area measured. It was then re-weighed to the nearest 0.1 g., milling solution being added from a pipette until the sample contained its own weight of the liquor, i.e., a 2.5 g. (air-dry) sample would contain 2.5 g. of solution. Milling was then begun, and after 5 or 10 min., depending upon the proposed total length of the test, the sample was removed, straightened out and its area again measured. It was next re-weighed and its original weight restored by adding water. Milling was then continued, this procedure being repeated until the required shrinkage had been attained."

The following method was adopted for testing samples of loose wool:

A 5.0 g. sample of the material was

placed as evenly as possible in the box of the machine (attainment of uniform distribution in the box is greatly facilitated if the sample is in the form of carded sliver), and 5.0 c.c. of 10% sodium oleate solution was pipetted evenly over it. The top plate was then placed in position and milling begun. The sample rapidly felts into an approximately circular pad, of thickness equal to the depth of the sample box. After 10 min. the pad was removed, weighed, and the weight made up to 10 g. as previously described. On returning it to the machine, the sample was reversed top and bottom in order to promote even milling as far as possible."

A method and apparatus for determining the extent of felting by measuring the compressibility of the block is given.

Samples of loose wool to be tested for acid milling were placed in the machine, then tied up loosely with two pieces of tape, care being taken to disturb the distribution of the sample as little as possible, and soaked overnight in 500 c.c. of buffer solution (sodium acetate1hydrochloric acid, final pH 1.38); they were then dried by squeezing between folded filter paper, the tapes removed, and, after weighing, sufficient of the solution in which the sample had been soaked added to bring the total weight up to 10 g. Felting was then carried out in the usual manner.

The limiting factor in the accuracy of results obtained by the use of this machine is probably the inherent sample-to-sample variation of the original material, rather than irregularities in the behavior of the mechanism.

DYEING JUTE IN WARP FORM

The Dyer & Textile Printer, page 263, Vol. XCIV, No. 7, September 28, 1945.

Three outstanding advantages are listed as accruing from the use of a beam dyeing machine for processing jute warp: (1) the warp remains in a stationary position during the various wet-precessing operation relating to the coloring operation, hence individual warp strands are rarely broken or frayed; (2) the adoption of the beam dyeing principle removes all risk of that form of color unlevelness known among warp dyers as "running-off," which frequently arises when warp is colored in rope-form order in a dyeing machine of the semi-obsolete multi-box type; (3) the duration of the coloring process can be extended at the pleasure of the dyer, this being of considerable importance when black or some other weighty shade is to be produced on the warp by dyeing it with a somewhat tardily-absorbed dyestuff such as, for instance, sulfur black, or, more rarely, an acid color.

Direct dyeing colors should be of a freely soluble type. A list of suitable colors is given. Notes on the actual dyeing operation are given.

MECHANISM OF THE DIRECT OR SUBSTANTIVE DYEING OF CELLULOSE FIBERS

Robert E. Rose, Textile Research Journal, page 383, Vol. XV, No. 11, November, 1945.

This paper is based on material presented at the American Association for the Advancement of Science, Conference on Textiles, Gibson Island, July 1945.

The contents are summarized by the author as follows:

Acetate cellulose is dyed by direct solid solution.

Cotton, viscose, and other cellulose fibers are dyed by the adsorption of specially suitable colored molecules on the crystallites but, in addition, there is dyeing by solution of the dye in monomolecular form in the cellulose gel of the fiber.

The approach of the dye to the fiber surface is promoted by the presence of sodium ions, which overcome the electrostatic resistance of the negative fiber surface.

Direct dyes that dye levelly are presumably more soluble in the cellulose gel than are those that dye unlevelly.

Wool and silk are dyed by solid solution and chemical valency forces; acid promotes the take-up of these dyes by altering the surface change on the fiber.

The condition of dyes on all fibers is either one of solid solution or no more than a monomolecular layer on the adsorbing surface "within" or on the fiber. However, in certain cases the dye may agglomerate to form larger micelles or even to cause pigmentation.

DECREASING THE ACID DEGRADATION OF COTTON SEWING THREAD

J. David Reid, Laurence W. Mazzeno, Jr., and Kyle Ward, Jr., Textile Research Journal, page 26, No. 1, Vol. XVI, January, 1946.

The authors' conclusions and summary follow:

The degradation of cotton sewing thread used to close multi-wall paper bags for shipment of triple superphosphate is due mainly to the halogen acid fumes released by action of the phosphoric acid upon the halides present. The use on the thread of alkaline sizing agents, or protective coatings such as soap or beeswax, is comparatively inefficient, as is the use of carbonates in the fertilizer to neutralize the acid. However, the use of a mildly alkaline humectant agent such as triethanolamine, impregnated into the thread in amounts of about 35 per cent, gives good protection in both accelerated trials in laboratory tests and in use tests involving 80-day storage. The amine must be so applied that drying of the thread in bulk at temperatures approaching 212° F. (100° C.) is avoided, for this causes a degradation of the thread. Drying at such temperatures in single strand, however, introduces no difficulty.

ACETYLATED COTTON HIGHLY RESISTANT TO ROTTING

Charles F. Goldthwait, James McLaren and Samuel T. Voorhies, Jr., Textile World, page 115, Vol. 96, No. 2, February, 1946.

By partial acetylation a modified cotton is produced which is highly resistant to mildewing and rotting. By partial acetylation is meant the conversion of cotton cellulose to a modified cellulose in which some of the hydroxyl groups are replaced by acetic acid radicals. Methods for treatment of yarn, thread and cloth are given. The process is suggested for use where "cotton is exposed to especially adverse conditions of micro biological attack, and may fit particularly well into the manufacture of articles in which cotton is an important although small part of the structure, and where acetylation would insure a much longer life at a relatively small cost."

Resist and cross-dye effects may be obtained inasmuch as many cotton colors will not stain either white or colored acetylated cotton and acetate rayon colors will dye the material.

Results of rotting tests on the material are given.

CROSS-DYEING SOCKS GIVES HEATHER EFFECT

Textile World, page 127, Vol. 96, No. 2, February, 1946.

Socks are knitted of "mock-twist" yarn spun from one end of white and one end of black roving. When the socks are dyed with a standard color, the white portion assumes the standard color and the black portion assumes a very dark shade of the standard color, thus producing a heather effect.

X-RAY STUDIES OF THE STRUCTURE OF PLASTICS

W. T. Asbury, Journal of the Society of Dyers and Colourists, page 3, Vol. 62, No. 1, January, 1946.

This is a summary of a lecture before a joint meeting of the Manchester and Lancashire Sections of the Textile Institute.

X-ray studies of plastics can be of help in two ways: (1) by revealing the state of aggregation and orientation irrespective of detailed knowledge of the atomic arrangement inside the molecules, and (2) by contributing ultimately to the working out of the atomic arrangement itself. A few selected diffraction patterns are referred to and illustrated by X-ray photos.

THE USE OF POLYMERS TO MAKE WOOL UNSHRINKABLE

Part I—Anhydrocarboxyglycine

A. W. Baldwin, T. Barr and J. B. Speakman, Journal of the Society of Dyers and Colourists, page 4, Vol. 62, No. 1, January, 1946.

The usual methods of making wool unshrinkable depends upon their action in masking or modifying the scales thus eliminating the fiber travel which causes milling shrinkage. A gelatinous degradation product of keratin is formed on or under the scales resulting in a loss of wear resistance. It is therefore desirable to accomplish the masking of scales by depositing substances on the surface of fibers rather than by superficial degradation of the wool itself. Such methods have been proposed but the ready-made polymers used are soon removed by everyday use, particularly in laundering. If the surface deposit could be anchored chemically the problem would be solved but this is difficult to achieve. The possibility of building up films of polymer on the reactive side-chains of wool fibers by means of suitable monomers was considered and anhydrocarboxyglycine seemed ideal for this purpose because polymerization is initiated by water and the treated fibers, being coated with what is essentially a protein film, should retain the characteristic properties of wool apart from an inability to undergo milling shrinkage. In addition, it seemed likely that the film of polymer would be anchored to the fibers by reaction with basic side-chains.

A series of experiments indicate that optimum conditions for rendering wool unshrinkable by means of anhydrocarboxyglycine are: Treatment at 50° C. for 6 hr. with 5% of the reagent dissolved in ethyl acetate to which 2% of water (by vol.) has been added, the liquor wool ratio being 33:1.

Fabrics subjected to this treatment were further tested for various properties and the following conclusions drawn: (1) fabric increases in weight by about 4% and shows little tendency to shrink in soap or acid milling; (2) unshrinkability is caused by masking the surface scales of the fibers with a film of polymer; (3) the unshrinkable finish is unimpaired by treatment with hot organic solvents; (4) the polymer is anchored to the fibers by reaction with the basic side chains; (5) resistance to wear is three times that of untreated wool.

THE DYEING OF COTTON WITH MINERAL KHAKI

Part VIII—The Incorporation of Copper with Chromium and Iron in Mineral Khaki for the Production of an Effective Fungicide and Bactericide.

E. Race, F. M. Rowe and J. B. Speakman, Journal of the Society of Dyers and Colourists, page 9, Vol. 62, No. 1, January, 1946.

It was believed that a further component is essential in the chromium-iron impregnating bath used in mineral khaki dyeing in order to produce effective bactericidal and fungicidal properties.

Tests proved that copper carbonate, "even when present in relatively small quantities along with iron or with chromium and iron on the fiber, provides a toxicity towards cellulose-decomposing fungi and a wide range on non-cellulose-decomposing fungi. There appears to be, however, a minimum value for the copper carbonate content of the pigment on the fiber below which toxicity towards cellulose-decomposing bacteria is not achieved. Thus, when the material contains $<0.5\%$ approx. copper (calc. as CuO on the weight of the fiber), although, due to the absence of visible fungal growth, there are no apparent signs of deterioration, especially in the early stages, degradation of the fiber is liable to occur by bacterial action. When the copper content of the pigment on the material is $>0.5\%$ (calc. as CuO on the weight of the fiber), attack by cellulose-decomposing bacteria is virtually inhibited and degradation of the cotton, even after incubation for comparatively long periods, is slight. Consequently, in order to ensure maximum protection of the fiber from attack by fungi and bacteria, it is suggested that the pigment on the material should have a copper content of not less than 0.5% (calc. as CuO on the weight of the material) and, in the case of a pigment containing copper, chromium and iron, a total oxide content of not less than 2% (calc. as oxides on the weight of the material), or, in the case of a pigment containing copper and iron, a total oxide content of not less than 1.4% (calc. as oxides on the weight of the material). The concentration of chromium salt in the impregnating liquor should not be allowed to exceed the equivalence of 4.8 g. approx. Cr_2O_3 per l. (i.e. 32 g. chrome alum per l.), since too great a concentration of chromium salt in the impregnating bath results in an appreciable decrease in the copper content of the pigment on the fiber."

THE DYEING OF COTTON WITH MINERAL KHAKI

Part IX—The Effect of Exposure to Weathering Agencies on Yarns Pigmented with Copper, Chromium and Iron Compounds.

E. Race and F. M. Rowe, Journal of the Society of Dyers and Colourists, page 19, Vol. 62, No. 1, January, 1946.

Exposure tests were conducted on yarns proofed with chromium; chromium and iron; copper, chromium and iron; and various copper compounds. Conclusions drawn as a result of these tests indicate that:

Material which is to be subjected to exposure in a temperate climate, free from contamination by soil or a nutrient medium highly susceptible to attack by micro-organisms throughout its service life, will be degraded by photochemical action rather than by attack of micro-organisms and should be proofed with trivalent chromium compounds or by the mineral khaki process.

Where the material in use in temperate climates is apt to come into contact with soil or similar media, proofing with trivalent chromium is not sufficient and the use of copper compounds is essential. This is because the resistance to microbiological attack of materials treated with trivalent chromium compounds, or with trivalent chromium and iron, is very limited.

In tropical and jungle zones where the chances of infection by micro-organisms are great and conditions optimum for growth, proofing with trivalent chromium compounds is inadequate and the use of a toxic proofing agent such as copper becomes necessary.

The serious leaching of copper from cotton during exposure in industrial regions is due to the acid conditions which prevail. Leaching of copper from cotton in non-industrial tropical zones, in spite of the heavy rains will probably be less serious because of the neutral condition of the moisture. Photochemical action, in conjunction with the rain, may be a prime factor in such cases but would require exposure tests in those regions to determine whether this is so.

FRICTION BETWEEN KERATIN SURFACES AS AFFECTED BY SOME SHRINK-PROOFING TREATMENTS

M. Lipson and P. Howard, Journal of the Society of Dyers and Colourists, page 29, Vol. 62, No. 1, January, 1946.

It is shown that it is not necessary to alter the physical structure of the fiber scales in order to reduce their directional frictional effect (D.F.E.) on a smooth keratin surface. Treatment of the keratin surface alone with certain of the reagents used for reducing shrinkability will bring about the necessary reduction. This indicates that the D.F.E. is not simply the physical result of scaliness. It also shows that when dealing with fiber surfaces in which the coefficients of friction are very low, the D.F.E. is not as important in interpreting results as the actual value for the coefficients of friction in each direction. It is necessary to have both keratin surfaces treated by the different reagents when observing the

effect of the latter on the wool fiber surface. With both surfaces treated it has been found that all the reagents used for reducing shrinkability, except alcoholic caustic potash, markedly reduce the with-scale and anti-scale coefficients. Alcoholic caustic potash increases the value of each.

In the experiments the wool used was prepared from a 64s quality Merino fleece of good length, uniformity, and freedom from excessive dirt and vegetable materials. The smooth keratin was prepared from the tips of cattle horns which had been turned on a lathe.

BOOK REVIEWS

GLYCERINE, ITS INDUSTRIAL AND COMMERCIAL APPLICATIONS

By Georgia Leffingwell and Milton Messer. Foreword by Walter J. Murphy. 259 pages. Price $5.00. Published by Chemical Publishing Co., Brooklyn, N. Y. 1945.

Few chemicals serve the chemist and the manufacturer in so many different ways as glycerine. In fact the authors list fifteen hundred and eighty-three ways in which glycerine may be used. In war times and in peace enormous quantities are used each year. In the early days glycerine was classified as a by product of soap manufacture, but now particularly during war times it ranks with soap in primary importance. It is of such importance that we cannot avoid it in our every day life, being present in many medicines, foods, beverages and cosmetics.

The book is a comprehensive survey of the large number of industrial products which contain glycerine. Twenty-six of the thirty chapters are individually devoted to a single use of glycerine. Additional chapters are devoted to the chemistry of glycerine and its derivatives, also its history, and an extensive bibliography.

The authors have succeeded in writing a practical treatise which will provide chemists, manufacturers, salesmen, industrial workers and students with many useful hints as to the utilization of glycerine in their products and in the formulation of new compounds. The clear and simple style in which the book is written will be welcomed by the non-skilled who want to formulate products for their own use.

THE STORY OF LINEN

By William F. Leggett, author of Ancient and Modern Dyes; Associate Editor of Rayon Textile Monthly. Published by the Chemical Publishing Co. Inc., Brooklyn, N. Y. 1945. 103 pages. Price $2.75.

This book gives an interesting account of the development of the linen industry going back to 12,000 years B.C. when evidence is found that the Swiss Lake Dwellers produced crude but serviceable flax and manufactured linen fabrics. From this beginning the author describes development through the activities of the Egyptians, followed by the developments in Greece, Rome, France and finally in England and the American Colonies, and shows how closely the manufacture of cloth is related to the history of flax.

The author hopes that through this book the reader will not only understand the habits and culture of the ancient peoples, but become more familiar with the artistic characteristics of the early textile materials which they produced.

One is amazed at the prominence of linen in the life of our Colonial ancestors. The following quotation from Judge Samuel Sewall's famous Diary written about 1780 tells of a spinning bee on the Boston Common, "five hundred fashionable women took part for spinning has become in Boston as it did centuries before in Greece an occupation for every householder."

No attempt is made by the author to go into the modern mechanical side of the linen industry, but the reading of this book will be of interest to those engaged in the industry as well as those merely eager to learn the history of the fiber which played such an important role in the development of the textile industry.

ADVANCES IN CARBOHYDRATE CHEMISTRY

Volume I. Edited by W. W. Pigman of the Corn Products Refining Co. and M. L. Wolfrom of the Ohio State University. It is the composite work of thirteen authoritative contributors. Published by the Academic Press Inc., 125 East 23rd St., New York. 1945. 374 pages. Price $6.00.

This is the first of a series of annual publications on the advances made in carbohydrate chemistry. For each volume invitations will be extended to selected research workers to prepare critical reviews of special topics in the broad field of carbohydrates, including sugars, polysaccharides and glucosides. It is also intended to cover as far as available space will permit, biochemical, industrial and analytical developments.

These articles will cover fields which have matured and will be quite complete from the historical point of view. After a number of years it is hoped that the aggregate of these articles will provide a fairly complete summary of carbohydrate chemistry.

Textile Chemists are so intensely interested in many phases of carbohydrate chemistry that this series of books should be of special interest to them. It will provide for the chemist an opportunity to keep up with the advances in this branch of chemistry without having to search through an indefinite number of journals and books.

YOUR COST OF POST WAR TAX PROPOSALS

Estimates of the Postwar Federal Budget and Tax Rates Necessary to Balance It. By Clinton Davidson, Jr., Director of Division of Research, Department of Popular Education, Harding College, Searcy, Arkansas. Published by Harding College, Searcy, Arkansas. 76 pages. 1945.

This is a book about the taxes you will pay during the post war period. It shows how your tax rate will depend on two things—the size of the national budget and the procedure Congress follows in levying taxes to meet it.

Three possible programs of government spending are discussed—the Thrift Budget—the Thriftless Budget and the Spendthrift Budget, showing where the government money will probably go in each case and the pitfalls surrounding the Spendthrift program.

A tax program is recommended that will balance the budget. Other recommendations are made for the purpose of encouraging private investment in private industry thereby providing greater employment.

The author gives us within these pages a realistic workable program that would benefit all classes of taxpayers. We believe this book will be of interest to all taxpayers and today that means nearly everyone.

HACKH'S CHEMICAL DICTIONERY

Third Edition. Completely Revised and Edited by Julius Grant. 925 pages. Price $8.50. Published by The Blakiston Co. Philadelphia, Pa.

This Chemical Dictionary, which has just been brought up to date contains over 57,000 entries. It contains the words generally used in chemistry and many of the terms used in related sciences. It is based on the most recent chemical literature and is illustrated with numerous tables, diagrams, portraits, and other illustrations.

It gives clear, brief statements of the theories, rules, and laws of chemistry. There are accurate descriptions of elements, compounds, drugs, minerals, vegetable and animal products. Chemical apparatus, equipment and instruments are mentioned, and the names of scientists who have contributed to the progress of chemistry are likewise noted. Here will be found the latest data on Atomic Disintegration.

This dictionary will prove of invaluable assistance to many students and scientific workers. It is remarkable for the amount of information in one handy volume.

SURFACE ACTIVE AGENTS

Theoretical Aspects and Applications by C. B. F. Young, Ph. D. 381 pages. Price $6.00. Published by Chemical Publishing Co., Inc., Brooklyn, N. Y. 1945.

The authors have endeavored, and we believe successfully, in treating the theoretical aspects of surface tension and its applications in a comprehensive text book. An endeavor has been made to present useful information concerning the origin, effect and utilization of surface tension phenomena in hope that the transfer of knowledge from one field to another may help to ease the problems of research for industrial workers, and provide the germ of an idea for improving processes.

The relation between surface tension and other physical properties of matter and characteristics and effects of surface active agents are treated in detail. Methods for the determination of surface tension are described and apparatus used is illustrated.

Diverse branches of industries in which surface active agents are used are discussed and many typical formulae given which will facilitate the formulation of emulsions and other products based on the utilization of surface active agents.

Numerous illustrations, tabulated data, a well selected bibliography and chemical and mathematical equations round out the usefulness of this handy volume which will be equally welcomed by chemists, engineers, technicians, salesmen, students and laymen who desire to acquire an up-to-date knowledge of this subject of ever-growing importance.

We believe that this book will fill a valuable place in the library of those who have to deal with surface active agents and their applications.

FLUOROCHEMISTRY

By Jack De Ment. Research Chemist, Fluorescent Laboratories. 752 pages, fully illustrated. Published by Chemical Publishing Co., Inc., Brooklyn 2, N. Y. 1945. Price $14.50.

Fluorescent Chemistry is applicable to almost every branch of chemistry, medicine and industry.

This book embraces theory as well as the industrial, scientific, and other applications of fluorescence, luminescence and other radiation. It not only gives definitions of the basic concepts of fluorochemistry, but explains in simple language its phenomena and applications. It describes methods for the preparation of the various luminescent organic substances, dyestuffs and coloring matters, and ultraviolet emitting inorganic and organic substances and gives qualitative and quantitative tests for their identification. In this connection 2896 individual compounds are tabulated, also many dyes with the Colour Index numbers.

One of the objects of this book is to present certain experimental results of fluorochemical research in the hope that their examination and comparison with the results of investigators in other specialized fields of chemical physics, will widen the views of the science of fluorochemistry as a whole. Many tables (146) and extensive bibliographies are included.

TRADE NOTES • NEW PRODUCTS

• DuPONT APPOINTMENT

James S. Denham, assistant manager of the Rayon Department, has been appointed general manager of the Photo Products Department to succeed George A. Scanland, who will retire March 18 for reasons of health, the DuPont Company announced recently.

• NEW DEXTER BOOKLET

A new booklet has been issued by the Textile Chemical Division of the Dexter Chemical Corporation. The booklet, "Mercerizing and Dypenol," is attractive in appearance and deals with its subject clearly and completely. The Dexter organization is especially fitted to deal with the subject of mercerization since its technical director has done research in this field over a period of years and is considered an authority.

Copies of this booklet will be sent upon request to Dexter Chemical Corporation, 819 Edgewater Road, New York 59, New York.

• JOINS ARNOLD, HOFFMAN

Arnold, Hoffman & Co., Inc., announces the addition of Lt. Col. Harry Green to its Southern Sales force. Col. Green is a graduate of Clemson College, receiving a B. S. degree in chemistry in 1936. Prior to his entry into the Army in 1941, he was chemist for the five mills of Maine Industries.

He served as battalion commander with the 10th Mountain Division in Italy and was the recipient of the Silver Star for gallantry in action.

Col. Green will cover the Georgia territory for **Arnold, Hoffman & Co., Inc.**, and will make his headquarters in Columbus, Georgia.

• CALCO BULLETIN

The latest Calco Technical Bulletin No. 785, "Some Fundamental Principles of Vat Dyeing," has been released for distribution to the textile industry, it has been announced by the Calco Chemical Division, American Cyanamid Company, Bound Brook. The bulletin is especially timely in view of the increasing attention given to vat dyes and their use by textile chemists and dyers; certainly those with little previous experience in this field will have to master their properties and dyeing methods. Dyers who have gained experience during the past several years on O. D. shades and the relatively few shades used in their production, may have to refresh their knowledge of the properties and application methods of the full range of vat dyes used to meet the civilian demand for countless shades of yarn and fabrics containing various fibers. It is also pointed out that newly devised methods of vat dyeing may be more effectively used if the vat dyer has a sound fundamental knowledge of vat dyes and their behavior.

The new bulletin discusses the general dyeing characteristics of vat dyes, methods of modifying and controlling the dyeing behavior and the effect of temperature on the reduction rate of vat dyes. It also discusses the influence of temperatures and assistants in the stripping of vat dyeing.

A copy of Calco Technical Bulletin No. 785 may be obtained by writing the Advertising Department, Calco Chemical Division, American Cyanamid Company, Bound Brook, New Jersey.

• JOINS DEXTER CHEMICAL

Afred Driscoll, for the past five years Chief Chemist for the Celludye Corporation of New York has joined the Dexter Chemical Corporation of that city as a member of the research staff of its textile chemical division.

Prior to his connection with Celludye Corporation, Mr. Driscoll was Chief Chemist at the Columbia Paint and Varnish Co., having been a consultant chemist in the field of varnishes, paints and synthetic resins for several years previously.

Born in London, England, Mr. Driscoll was educated in this country at the College of the City of New York from which he graduated with high honors.

Major John J. Owen, who has been appointed to the staff of the Institute of Textile Technology for research work in the field of textile machinery and machine design.

Major Owen received his B. S. in mechanical engineering from the University of Virginia in 1939. After a year with Westinghouse Electric and Manufacturing Co., Pittsburgh, Pa., as engineer in manufacturing methods he entered the employ of Millers Falls Co., Greenfield, Mass., manufacturer of hand tools.

Mr. Driscoll is a member of the American Chemical Society, the New York Paint and Varnish Production Club and the American Association of Textile Chemists and Colorists.

● **PERSONNEL CHANGES, STEIN, HALL**

Stein, Hall & Co., Inc., New York, has announced the resignation, effective June 30, of Dr. Alexander Frieden, vice-president and director of its Technical Division.

Dr. Frieden has been associated with Stein-Hall for more than ten years. As Technical Director he has contributed greatly to the scientific development of the company's lines of starches, dextrines, dry gums, liquid adhesives, flexible glues and specialty products used by the adhesive, food, paper, textile and many other industries. His services as head of the laboratories and technical field work were particularly valuable during the war when scarcity of materials necessitated development of substitute products.

Lt. Col. J. Rex Adams, who joined the company recently as manager of the Development Department, has been appointed Acting Manager of the Technical Division.

Lt. Col. Adams served for five years in the Army Chemical Warfare Service in charge of incendiary bomb development. For ten years before the war he was a paper converting specialist. He was active in the affairs of the Technical Association of the Pulp and Paper Industry and is well known in the paper and adhesive industries throughout the country.

James J. Casserly, who has joined the "Ceglin" Textile Finishes Division of Sylvania Industrial Corporation as a member of the technical sales staff. During the war Mr. Casserly was a Captain in the Chemical Warfare Service, having entered it immediately upon graduation from Clemson A. & M. College, Clemson, South Carolina.

● **CATALOG OF TECHNICAL BOOKS**

A new catalog of technical books has just been issued by The Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, N. Y. This catalog includes the latest books on chemistry, physics, science, technology, medicine, foods, formularies, drugs and cosmetics, engineering, metals, technical dictionaries, building construction, etc.

This catalog, conforming with the requests of technical and scientific workers and librarians, gives the date of publication of each book as well as price, number of pages, detailed descriptions and full table of contents.

● **CIBA CELEBRATES SILVER ANNIVERSARY**

On January 31st, 1946, The Ciba Company, Incorporated, held a dinner and dance in the North Ballroom of the Hotel Astor in New York commemorating the twenty-fifth anniversary of the Ciba Company. All employees who had served three or more years with the company were invited to the dinner. Seated at the head table were the "Twenty-Five Year Group."

During the evening announcement was made of the resignation of Frank B. Common—K. C. of Montreal, Canada, as chairman of the Board of Directors. He is succeeded by Alfred F. Lichtenstein. Also announced were the election of Dr. Harry B. Marshall as President of Ciba Company and the election of two new Vice-Presidents; S. I. Parker and J. P. Bauer.

T. L. W. Bailey, Jr., who has been appointed to the staff of the Institute of Textile Technology as Research Microscopist.

Mr. Bailey received his B. S. degree from Clemson Agricultural College in 1926, and remained three years to work on cotton investigations in the South Carolina Experiment Station. This program was concerned with influencing fiber development in the cotton plant in desired directions.

From 1929 to 1941 Mr. Bailey was Cotton Technologist with the U. S. Department of Agriculture. When the USDA set up its regional program he was assigned to the Southern Regional Research Laboratory in New Orleans as Fiber Microscopist. He served in this capacity from 1941 to 1946.

The entire personnel of the company, represented at the party by 170 employees, presented Mr. Lichtenstein with a gold watch in appreciation of his fine leadership of the company during the last twenty-five years.

The company in turn awarded gold wrist-watches to fourteen of the employees who had been with the company since its inception.

● **APPOINTED NUODEX MANAGER**

George H. Moyer has been appointed to the newly created post of Manager of the Chicago District of Nuodex Products Co., Inc., it was announced by John W. Van Tuin, Manager of the Western Division.

Mr. Moyer, whose offices will remain at 600 South Michigan Avenue, Chicago 5, headquarters for the Western Division, has represented the company in this area since last March, and the importance of his territory combined with his highly satisfactory work prompted the decision to elevate him to the new position.

● **ELECTED PRESIDENT, T. R. I.**

The board of directors of Textile Research Institute, Inc., on March 7 elected

Dr. Boris Schwartz, who has been appointed chief research chemist for the Hart Products Corp., manufacturing chemists, New York City. Dr. Schwartz received his B.S. in chemistry and doctorate in biochemistry and organic chemistry from Rutgers University. For the past three years he was engaged in chemical research, primarily on surface active materials, moth-proofing agents, mildew-proofing substances, water repellents and similar products for the textile industry. A Phi Beta Kappa, Dr. Schwartz is also a member of Sigma Xi, Phi Lambda Upsilon, the American Chemical Society and the A.A.T.C.C.

Emil W. Peters, who has joined Onyx Oil & Chemical Co. as hosiery technician. He graduated from Philadelphia Textile Institute in 1936, taking chemistry and dyeing courses. Since his graduation he spent five years as a dyer in the hosiery trade and five years with the Research and Development Division of the Philadelphia Quartermaster Depot.

Charles C. Tillotson, who has returned to the staff of the Procter & Gamble Company after serving four and one-half years as an officer in the Coast Artillery Corps., where he attained the rank of Lt. Colonel. He spent considerable time in the Mediterranean Theater of Operations and the European Theater of Operations. He will resume his duties with the Textile Research Department of the Chemical Division where he will study the application of soap and synthetic detergents in textile processing. Mr. Tillotson is a graduate chemical engineer of Kansas State College and a member of Sigma Tau.

Lewis Sanders to the office of president, to serve as head of the Institute's administrative staff.

Mr. Sanders is a native New Yorker. Until January, 1946, he served in the office of the Chief of Staff on the Special Staff in Washington, with the rank of colonel. For two years he was consultant on manpower and industrial matters to the Senate Committee on Military Affairs, and for three years he was Chief of the Re-employment Division of the Selective Service System, which Division he organized. In World War I he served as a major of field artillery.

Lewis Sanders

Mr. Sanders is a graduate of Stevens Institute of Technology with the degree of Mechanical Engineer. He has done research work and directed a research staff of thirty-six engineers in the General Electric Company. In the field of research he has also been advisor to the head of a large university with respect to the institution's research projects.

In the realm of business, Mr. Sanders' experience includes the organization and financing of corporations, the design, construction, and operation of plants, and the handling of labor and labor problems. As a consulting engineer, he has worked with cotton, woolen, and silk mills on power plant and lighting problems.

● CHICAGO BRANCH, STEIN, HALL

The Chicago Branch of Stein, Hall & Co., Inc., New York, celebrated the opening of its new offices and laboratories at 23 East Jackson Blvd., with a housewarming attended by a large number of customers and other friends. In addition to general and private offices, the new location includes an industrial and a food laboratory.

Company officers attending the housewarming were Edwin Stein, president; M. S. Rosenthal, vice-president; D. M. Hawley, vice-president; and O. H. Clapp, vice-president in charge of sales. George A. Krisan, Chicago Branch Manager, was chief host representing the local staff.

● DAN RIVER EXHIBIT

An exhibit featuring various new applications of plastics to textiles will be displayed at the National Plastics Exposition in Grand Central Palace, New York City, on April 22 to 27, by Riverside & Dan River Cotton Mills, Inc., Danville, Va., and Walter Kidde & Company, Belleville, N. J., builders of the Fiber Bonded machines developed by Dan River Mills.

Similar displays have been made recently at the convention of the American Association of Textile Chemists and Colorists in New York, January 3 to 5, and at the Exposition of Chemical Industries in New York, February 25 to March 2.

The display at the Plastics Exposition will be directed specifically to a demonstration of the major part which plastics are now enabled to play in practically every division of the textile industry by reason of these Dan River processes.

● JOIN SONNEBORN

Dr. Henry Sonneborn, III, until recently on active duty as a lieutenant in the USNR, and Dr. Hans Schindler, research chemist, have joined the technical staff of the Petrolia, Pa., refinery of L. Sonneborn Sons, Inc.

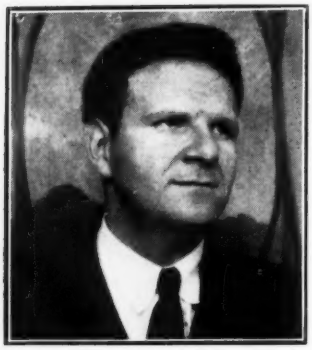
● METROPOLITAN OFFICE, CALCO DYESTUFFS

The offices of the Metropolitan District Sales Division, Dyestuff Department, of the Calco Chemical Division, American Cyanamid Company, Bound Brook, New Jersey, are now located at 30 Rockefeller Plaza, New York, N. Y. Paul J. Luck, Metropolitan District Sales Manager, will be in charge of all sales activities of the department.

● Du PONT PERSONNEL CHANGES

Two changes in the production management of the Nylon Division have been announced by the Rayon Department of E. I. du Pont de Nemours & Company.

W. E. Gladding, manager of the nylon plant at Seaford, Del., since October 1, last year, has been named director of production. He succeeds C. M. Switzer,



Gerson Hermann, who has been appointed textile chemist on the research staff of Alrose Chemical Co., Cranston, R. I. This appointment is in line with the post-war expansion program of Alrose. Mr. Hermann is a graduate of Massachusetts Institute of Technology and has been associated with: Phoenix Color & Chemical Co., William Filene's Sons Co., Sherwin-Williams Co., Alabama Ordnance Works, and National Fireworks, Inc. He was also a research associate at M.I.T. He has specialized in textile chemistry, fatty acids and explosives.

who recently was made assistant manager of the Nylon Division. Norman H. Winde, manufacturing superintendent at Seaford, succeeds Mr. Gladding as plant manager.

● CONTINUOUS PIGMENT VAT DYEING

Patent rights covering the process of continuous pigment vat dyeing were granted on March 19 to Glenn Womble of the research staff of Riverside & Dan River Cotton Mills, Inc., by the United States Patent Office. The number of the new patent is 2,396,908.

In line with its policy of making the practical results of its research available to the whole textile industry, Dan River Mills will begin very shortly to grant licenses on this process.

The dyeing method covered by this patent was discovered, developed and perfected in Dan River laboratories and dye houses by Mr. Womble after long experimentation.

Discussing the attitude of Dan River Mills toward the use of this process, H. M. Chase, director of research, said:

"Because of its contract with the Federal Government by which Riverside & Dan River Cotton Mills, Inc. granted to the Federal Government 'an irrevocable, non-exclusive, non-transferrable and royalty free license' to its processes of manufacture during the war period and for six months thereafter, Riverside & Dan River Cotton Mills, Inc. was pleased to see its continuous vat dyeing process used so generally for the speedy production of critical army goods.

"The contract with the Government provided that it should 'terminate on the date six months after the cessation of hostilities in all wars in which the United States is now engaged.' Accordingly, this Government Contract expired as of March 2nd, 1946, and the royalty-free arrangement came to an end.

"The result of this policy of permitting the royalty-free use of its processes for the benefit of the war effort was that hundreds of millions of yards of cloth were delivered to the Army in the correct shades and at speeds that eclipsed all the old methods."

It is claimed that the new Dan River process yields many advantages over older methods, the more important being:

1. Deep uniform shades are readily obtainable.

2. Speed of production is high, running up to 150 yards a minute, thus cutting costs.

3. Fastness properties are wholly comparable to those given by the slow and expensive pad-jig dyeing.

4. The dyestuffs, being in a dispersed state in water, may be salvaged, thus effecting savings.

5. The overall costs are considerably reduced below older methods.

The process is applicable to all types of cotton piece goods, to fabrics made of synthetic yarns and to mixed fabrics.

The exclusive and essential step in the process is what might be called the drying stage. The operating steps may be briefly summarized as follows:'

The fabric passes through a padder where the vat pigments are applied, then is squeezed through rolls and passes through a dryer where it is uniformly dried.

From the dryer the cloth passes on to the bath of reducing and dissolving chemicals, and thence through one or more booster boxes, very little time being required to develop the shade.

After rinsing, oxidation, and soaping if necessary and a final rinsing, the operation is complete.

● SYLVANIA INDUSTRIAL EXPANDING

To meet the growing post war demand for cellophane, Sylvania casings for meats, and Ceglin textile finishes, Sylvania Industrial Corporation has announced an extensive building program for its plant at Fredericksburg, Va.

Present plans call for the erection of new buildings and the expansion of present ones to increase the capacity of each department in the manufacturing process. Ground will be broken for the additions soon.

● NEW SOLVAY BRANCH

Solvay Sales Corporation has announced the establishment of a new office at No. 847 M & M Building, Houston, Texas. This new office, which will cover the states of Texas, New Mexico and Arizona, will be in charge of Col. S. O. Taylor.

Charles P. Gulick (left), president and chairman of the board of National Oil Products Co., congratulates Ralph Wechsler, treasurer, on his 25th anniversary with the firm as he hands him a gold watch commemorating the event. Mr. Wechsler, who joined the firm as a chemist in the research laboratories in 1921, has been treasurer of Nopco and a member of the board since 1932.

Col. Taylor is a veteran of both World War I and World War II having recently returned to Solvay after having served three years as Executive Officer at Patterson Field, Dayton, Ohio, as a member of the Air Corps. Prior to his latest entry in the Army, Col. Taylor was employed for a period of eleven years with Solvay Sales Corporation's St. Louis Branch.

● NATIONAL PLASTICS EXPOSITION

Hundreds of new plastic products and plastic parts, ranging from the latest developments in fabrics, home furnishings, office equipment, building materials and toys to the most modern in electrical devices, airplane and automobile parts and factory tools will be unveiled to the trade and general public at the first National Plastics Exposition, which will be held in Grand Central Palace, New York City, April 22 to 27, inclusive, it was announced recently.

The Exposition, first ever held on a national basis, is sponsored by the Society of the Plastics Industry, 295 Madison Avenue, New York, and will bring together for the first time in one place and at one time all the industry's leading manufacturers of raw materials and machinery, and companies that mold and fabricate the new and standard plastic

products and product parts.

More than two hundred companies will participate and scores of experts will be on hand to consult with manufacturers on technological phases of plastics.

On the first three days, only representatives of the trade will be admitted, but the general public may view the exhibits beginning Thursday, April 25.

Concurrently with the first three days of the Exposition, the SPI will hold a convention at which leading authorities will discuss the latest advances in plastics technology and application.

• WESTVACO EXPANDS SALES DIVISION

Westvaco Chlorine Products Corporation, New York, has grouped all Sales Department Technical affairs including Market Development and Technical Service into the Technical Sales Division, and appointed William T. Nichols Technical Sales Director to coordinate and expand technical sales activities.

For the past several years Technical Assistant to the Executive-Vice President at Westvaco, Mr. Nichols was for eight years in charge of research and Product Development at Westvaco's South Charleston plant.

The various activities of the Technical Sales Division have been put under the immediate supervision of K. W. Bayha, J. M. Smith, J. M. Payne and A. Feorge Stern.

K. W. Bayha now supervises Market Development work on many new Westvaco Chemicals being released, J. M. Smith continues in charge of Technical Service from Westvaco's New York office, while J. M. Payne continues to head Technical Consulting Service for the Middle West with headquarters at Westvaco's Chicago office.

A. George Stern, who has been in charge of Westvaco's Newark, California Division of the Technical Department now heads up Technical Consulting Service for the Pacific Coast with headquarters at the Newark plant.

• THERMOSETTING RESIN CATALYST

A catalyst to speed up action of thermosetting resins used in finishing textiles is described in a new bulletin, No. 110, of American Cyanamid Company's Textile Resin Department.

Known as Aerotex Accelerator 187, the product is an acid salt "buffered to give maximum stability and optimum pH." Soluble in water, Aerotex Accelerator 187 is added to the resin bath just before it is ready for use on fabrics. The solution, which is odorless, acts to hasten the polymerization of the resins. The compound has the appearance of fine white crystals and can be stored for long periods of time as it is chemically stable.

The steadily increasing use of resin finishes on textiles makes a catalyst of this type of considerable importance. Textile Finishing Bulletin 110, describing the product and its use, is available on request to the American Cyanamid Company, Textile Resin Department, Bound Brook, N. J.

• KLAUDER WELDON-GILES MERGER

Klauder Weldon Giles Machine Co. announce the merger of the Giles Dyeing Machinery Company, and the Klauder Weldon Dyeing Machine business recently purchased from the H. W. Butterworth & Sons Co., Philadelphia, Pa. by Wm. E. H. Bell, former manager of the Dyeing Machine Division of the Butterworth Co.

Mr. Bell was Vice-President and General Manager of the Klauder Weldon Machine Company prior to its acquisition by the Butterworth Co. He had been with Klauder Weldon since 1907.

The Giles Dyeing Machinery Company has been in existence since 1913.

These two well known lines of Dye House equipment, scouring, bleaching and dyeing machines will be manufactured at Adams Avenue and Leiper Street, Philadelphia 24, Pa.

The new company will concentrate on the manufacture of skein and raw stock (rotary type) stainless steel dyeing machines of the Klauder Weldon type and will supply all replacement parts for machines now in the market.

The personnel will include Mr. Bell and all those previously associated with the Giles Dyeing Machinery Company.

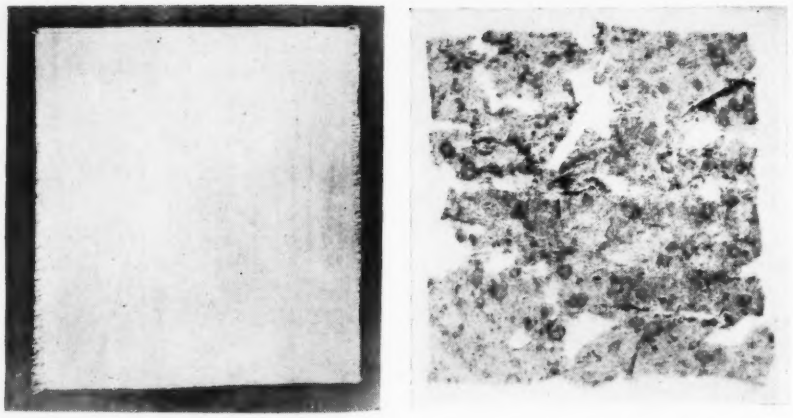
• HARTEX DUOFOL L

Hartex Duofol L, a sulfated synthetic ester claimed to possess superior wetting, softening and re-wetting properties has been introduced to the textile field by the Hart Products Corporation, 1440 Broadway, New York City.

The new product is a concentrated liquid, miscible with water in all proportions, even when cold, whose clear solutions and high surface active properties are said to not be affected by hard water, salt, alkali or weak acids.

It is stated that Duofol L is an outstanding wetting agent even at elevated temperatures and is recommended by the manufacturers in vat or pad dyeing and for dyeing operations in general to give

Something new in "Sales Management Conferences" is being tried out at National Oil Products Co., Harrison, N. J. It's a bi-monthly meeting of District and Division Managers of the Industrial Sales Department which convened recently at the plant for its first four-day session, designed to keep field representatives aware of current sales trends. Pictured at the meeting, left to right, seated: Miss Mary F. O'Connell, Adverising Manager; Thomas A. Printon, Vice-President in charge of the Industrial Department; and George H. Small, Southern District Sales Manager. Standing: Dr. Edwin A. Robinson, Technical Director and Manager of Textile Rayon Division; Harry G. Meegan, Manager of Textile Specialties Division; Robert F. McClellan, Chicago District Sales Manager; B. A. Schiller, Manager of Tanning Oils Division; John N. Gammon, Midwest District Sales Manager; Walter B. Morehouse, Manager of Paper Chemicals Division; Otto E. Lohrke, Manager of Metsap Chemical Division, and H. J. 'Bud' Waldron, New England District Sales Manager. George G. Stier, Manager of Specialties Sales Division, and Harry A. Batley, Manager of the Coordinating Division, were not present at the time this picture was made.



Identical pieces of canvas duck, one treated with the compound G-4, made by the Givaudan-Delawanna, Inc., and the other untreated, after a six weeks burial test in fungi-rich soil. It is stated that the canvas on the right is so badly rotted that it is useless, while the piece treated with G-4 remains in its original state. The compound is claimed to preserve any type of textile that may be subjected to deterioration caused by attack of fungi and bacteria.

greater uniformity of shade. It is said to be very effective in producing controlled shrinkage in Sanforizing and in obtaining higher slasher speed and greater loom efficiency in rayon warp sizing. Added to printing pastes, Duofol L is said to improve penetration and give better fastness to soaping.

The wetting-back property imparted to fabrics by Duofol L renders the fabric highly absorbent. In addition, it is claimed that it acts as a softening agent, making the product doubly desirable in the Sanforizing operation. Concentrations as low as 0.04% (about ½ ounce per 100 gallons of solution) have proved satisfactory for most applications.

● REPORT ON DYESTUFFS

More than a hundred new dyes, as well as many new intermediates for dye manufacture, developed by the I. G. Farbenindustrie and its subsidiaries between January, 1939, and September, 1945, have been uncovered through Quartermaster Corps investigations in Germany and Italy, the Office of the Publication Board said recently.

Included among the new products are dyes for dyeing and printing cotton, wool, rayon, nylon, and other fibers.

Comprehensive details on the new dyes are contained in a 520-page report, No. 2461, prepared by M. A. Dahlen, QMC consultant, and distributed by OPB. about 440 pages of the report are devoted to dyes. The rest of the report covers the use of hydrogen peroxide for sterilization of milk. Photostat copies of the report are obtainable through OPB at $35.00 each, and microfilms at $10.50 each.

Report No. 2461 may be ordered in Room 1312, Commerce Building, or by mail. Mail orders should be accompanied by check or money order, made payable to the Treasurer of the United States, and should be addressed to the Office of the Publication Board, Department of Commerce, Washington 25, D. C.

● STANDARD FABRICATORS EXPANSION

Standard Fabricators, Inc., 355 Walton Ave., New York 51, N. Y. are erecting a new building at 140th St. and Walton Ave. adjoining their present plant, which will be ready for occupancy in approximately six months. It is stated that the new building will enable the company to triple their present output. It will include new offices and increased manufacturing space.

● REJOIN TESCO CHEMICAL

Three ex-servicemen have rejoined Tesco Chemical Co., Atlanta, Ga. They are: Frank E. Cooper, who has resumed his old duties in the sales department, Dozier P. Willard, who is serving as a sales representative in the Atlanta area, and Frank dePeterse, Jr., who is acting as a service representative in the textile finishing trade.

● PATENT ABSTRACTS

Alien Property Custodian James E. Markham has announced that the second and final supplement to the abstracts of vested chemical patents is now available.

Mr. Markham said the supplement contains abstracts of about 800 patents and patent applications vested since publication of the first supplement in 1945.

The abstracts are grouped into 31 fields, Mr. Markham explained, ranging from heavy chemicals, drugs, foods, unit processes and ceramics, to plastics, pulp and paper, rubber and petroleum.

Both the first and the second supplements may be purchased from the Office of Alien Property Custodian, Chicago 3, Illinois, for one dollar each. The set of original abstracts, covering about 8,000 patents in the chemical field, may be obtained for $25.00 from that office.

● BOOKLET ON GUAR

General Mills, Inc., Research Laboratories, 2010 E. Hennepin Ave., Minneapolis 13, Minnesota, announces publication of a brochure entitled: "The Story of Guar." The folder covers the history of guar, agricultural and milling aspects and the use of guar flour in the paper, textile and other industries. As regards textiles, guar flour offers possibilities for use in warp sizes, printing pastes and finishes. Copies of the booklet are available upon request.

OBITUARY

LAURENCE E. MAY, nationally known chemist of the Sherwin-Williams Co., died suddenly Friday, March 1, at his home in LaPorte, Indiana, from coronary thrombosis. He was 51.

L. E. May

Mr. May joined Sherwin-Williams 30 years ago, shortly after graduating from Bradley College, Peoria, Illinois. At the time of his death, he was general superintendent of the Pigment, Chemical and Color Manufacturing Departments at the Chicago Sherwin-Williams plant.

As experimenter and teacher, he was largely responsible in bringing the Sherwin-Williams Chemical Department to its present position in chemical and color manufacturing. He was widely known in the Color and Chemical fraternity for his work on dyestuffs and intermediates. Several years ago he was treasurer of the Chicago Chapter of the American Chemical Society. At the time of his death he was a member of the Chemical Club of Chicago and National Consular of the American Chemical Society.

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Fabrics like this one owe much of their appeal to color — and the Pacific Mills depend, for color-correctness, on suppliers like Sandoz. *Thinking ahead with textiles.* Sandoz laboratories keep one step ahead of the fashion parade and another step ahead in technical progress . . . thus assuring you of fashion-right and technically dependable colors. For example, such acid colors as Alizarine Light Blue 4GL (Pat.) and Alizarine Light Violet 2RC (Pat.), exclusive colors of Sandoz which are level dyeing and very fast to light.

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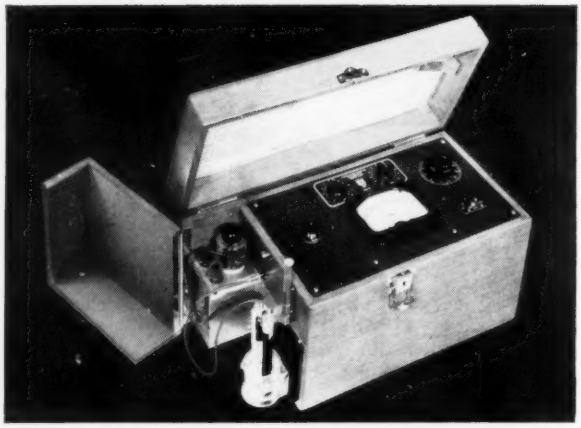

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Further details are in Catalog EX-96 (2), sent on request.

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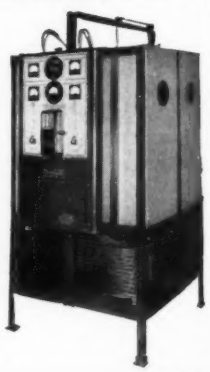

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• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.

CONFIDENTIAL EMPLOYMENT SERVICE — We invite correspondence (confidential) with Dyers, Chemists, Colorists, Superintendents, Master Mechanics, Office Managers, and others seeking positions and with employers seeking high-grade men to fill vacancies or to make replacements. Charles P. Raymond Service, Inc., 294 Washington St., Boston, Mass. Over forty-five years in business.

POSITION WANTED: Textile School graduate with B.S. in Chemical Engineering desires position in the East. Has had 4 years experience as colorist with large dyestuff manufacturer and 8 years as head dyer and dyehouse supervisor. Has taken additional engineering courses at Cornell University recently. Will consider laboratory or production capacity with dyestuff, chemical specialty or textile company. Also interested in engineering and sales. Age 33, married. Can give references. Write Box 838.

WANTED: A textile specialty manufacturer who desires representation in the middle west. Write Box 839.

POSITION WANTED: Married man 35 years old, 18 years experience bleaching, dyeing and finishing cotton and rayon piece goods, 10 years as supervisor, working knowledge of raw stock and package dyeing at present employed in standardization lab of dyestuff manufacturer. Desires a change. Write Box 840.

POSITION WANTED: Cotton and Rayon Dyer, age 48, Textile School graduate, wishes to secure position selling or demonstrating dyestuffs or textile specialties. Excellent references. Write Box 848.

FOR SALE: Van Vlaanderen Dry Box 37′ x 7½′ x 11′ in good condition. Can go to 265 degrees F. at 100 pound pressure. Silk type, 7 tiers net, batching device, etc. Reasonable. Write Box 844.

POSITION WANTED: 18 years experience in development and supervision of production of surface coatings which include pigment dispersions, resin emulsons, wax finishes, ethyl cellulose lacquer emulsions and elastomers. Desires position in charge of laboratory of progressive organization. 40 years of age. Write Box 845.

WANTED: Technical sales assistant with practical mill experience for the state of Pennsylvania. Must understand throwing and sizing processes, all types synthetic knitting and weaving yarns, including Nylon. Permanent position, excellent opportunity. Replies held in confidence. Give complete information, training, qualifications, age, references. Write Box 846.

WANTED: Chemical specialty salesman for Mid-Western territory with old established firm. Give age, experience, salary expected, etc. Write Box 847.

WANTED: Recent textile school graduate with the ability to maintain a laboratory control program in woolen textile mill near Troy, N. Y. Application should include detailed statement of education, type of experience, age and expected salary. Write Box 849.

WANTED: Salesmen, and Distributors by textile chemical firm. All territories open. Write Box 843.

POSITION WANTED: Chemist Dyestuff Salesman interested to represent dyestuff manufacturer in foreign markets, 20 years experience organizing and selling. Write Box 851.

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10 PRODUCTS of Proven Dependability

WHICH SHOULD WARRANT ★ YOUR ATTENTION ★

***AQUAROL :** A water repellent for processing woolen, cotton and rayon fabrics, also produces excellent results in splashproofing or finishing all types of hosiery.

***PARAMINE S :** A cation active softener for processing cotton and rayon cloth to obtain a soft, smooth, pleasing finish.

***ALGEPON S :** An assistant in dyeing vat colors to prevent premature oxidation of the reduced bath and eliminate uneven dyeings.

***ALGEPON V A :** Assistant for stripping vat colors—complete reduction of color in stripping bath providing lighter bottom for redyeing.

***PARAPON S A :** A highly efficient leveler and softener for dyeing and finishing all types of yarn, cloth and hosiery to produce a uniform dyeing and a soft full hand.

***ARIPEL F S :** Finish and gas inhibitor for processing dyed acetate rayon—produces a soft full feeling finish and prevents gas fading of the color.

***LANITOL F :** A synthetic detergent possessing exceptional scouring and washing properties for processing wool, cotton, rayon or nylon.

***CULOFIX :** Used as an after treatment in last rinse to prevent bleeding of direct dyed cotton or rayon in water.

***DIAZONOL A C :** For boiling out cotton cloth in pressure or open kiers to produce greater absorbency and cleaner material. Excellent for preboiling knitted cloth in preparation for chlorine bleach. Also used with good results for boiling out cotton or rayon cloth on the jig.

***TETRANOL 1638 :** A rapid wetting and penetrating agent. Active in acid, alkaline and salt solutions and not affected by hard water, may be used in all types of dyeing operations to insure positive penetration of color and a uniform and solid shade.

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